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Targeted next-generation sequencing and fine linkage disequilibrium mapping reveals association of *PNPLA3* and *PARVB* with the severity of nonalcoholic fatty liver disease

Running title: Association of *PNPLA3* and *PARVB* with the NAFLD

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Abstract

The genomic regions containing *PNPLA3*, *SAMM50*, and *PARVB* are susceptibility loci for the development and progression of nonalcoholic fatty liver disease (NAFLD). In order to search for all common variations in this region, we amplified the genomic DNA of 28 NAFLD patients by long-range PCR, covering the entire susceptibility region and sequenced the DNA using indexed multiplex next-generation sequencing. We found 329 variations, including 4 novel variations. Fine mapping of variations including insertion/deletions was performed for 540 NAFLD patients (488 with nonalcoholic steatohepatitis [NASH] and 52 with simple steatosis) and 1012 control subjects. HaploView analysis showed that linkage disequilibrium (LD) block 1 and 2 occurred in *PNPLA3*, block 3 in *SAMM50*, and block 4 in *PARVB*. Variations in LD blocks 1 to 4 were significantly associated with NAFLD as compared to control subjects ($P < 1 \times 10^{-8}$). Variations in LD block 2 were significantly associated with the NAFLD activity score (NAS), aspartate aminotransferase, and alanine aminotransferase. Variations in LD block 1 were significantly associated with the fibrosis stage. The strongest associations were observed for variations in LD block 4, with NASH as compared to simple steatosis ($P = 7.1 \times 10^{-6}$) and NAS ($P = 3.4 \times 10^{-6}$). Our results suggested that variations, including insertion/deletions, in *PARVB*, as well as those in *PNPLA3*, are important in the progression of NAFLD.

Key words: alanine aminotransferase, aspartate aminotransferase, fibrosis stage, NAFLD activity score (NAS), next-generation sequencing, nonalcoholic fatty liver disease, *PARVB*, *PNPLA3*

Introduction

Recently, nonalcoholic fatty liver disease (NAFLD) was recognized as an important health concern.[1, 2] NAFLD includes simple steatosis, nonalcoholic steatohepatitis (NASH), fibrosis/cirrhosis, and hepatocellular carcinoma. The frequency of patients presenting with NAFLD has increased gradually in Japan in proportion to the increase in the population with metabolic syndrome.[3] NAFLD is observed in 20–30% of the population in Japan and approximately 1–3% of these individuals are considered to have NASH, similar to American and European populations.[3, 4]

In addition to environmental factors, genetic factors are important in the development of NAFLD.[5] In order to elucidate these genetic factors, we previously investigated candidate genes and found that variations in the peroxisome proliferator-activated receptor γ coactivator 1α (*PPARGC1A*), angiotensin II type 1 receptor (*ATGR1*), and nitric oxide synthase 2 (inducible) (*NOS2*) genes are associated with NAFLD in Japanese individuals.[6-8] Genome-wide association studies (GWASs) have revealed that single-nucleotide polymorphisms (SNPs) in the patatin-like phospholipase domain containing 3 (*PNPLA3*) influence NAFLD and liver enzyme levels in the plasma.[9-12] We also reported that the risk allele (G-allele) of rs738409 in *PNPLA3* is strongly associated with NAFLD, as well as with increases in aspartate aminotransferase (AST), alanine aminotransferase (ALT), and fibrosis stage in patients with NAFLD in the Japanese population.[13]

Recently, we performed a GWAS and found that polymorphisms in the SAMM50 sorting and assembly machinery component (*SAMM50*) and parvin, β (*PARVB*) genes, in addition to those in *PNPLA3* were associated with the development and progression of NAFLD.[14] Variations used for GWAS were limited and at least 10% of SNPs were monomorphic or rare SNPs in the Japanese population. Many variations in the NAFLD susceptibility genomic region have not been investigated yet. Here, we performed targeted resequencing to identify all common variations in the entire NAFLD susceptibility genomic region. We constructed a fine linkage disequilibrium (LD) map of SNPs and insertion/deletions in the region and analyzed their association with the development and severity of NAFLD.

Materials and methods

Study subjects

The entire study was conducted in accordance with the guidelines of the Declaration of Helsinki. Written informed consent was obtained from each subject, and the protocol was approved by the ethics committee of Kyoto University, Yokohama City University, Hiroshima University, and Kurume University.

Control subjects (n = 1012) included Japanese volunteers who had undergone medical examination for common disease screening. Japanese patients with NAFLD who were underwent liver biopsy (488 with NASH and 52 with simple steatosis) were enrolled. Patients with the following diseases were excluded from the study: viral hepatitis (hepatitis B and C, Epstein–Barr virus infection), autoimmune hepatitis, primary biliary cirrhosis, sclerosing cholangitis, hemochromatosis, α1-antitrypsin deficiency, Wilson's disease, drug-induced hepatitis, and alcoholic hepatitis (present or past daily consumption of more than 20 g alcohol per day). None of the patients showed clinical evidence of hepatic decompensation, such as hepatic encephalopathy, ascites, variceal bleeding, or a serum bilirubin level greater than two-fold the normal upper limit.

Liver biopsy tissues were stained with hematoxylin and eosin, reticulin, and Masson's trichrome stain. The histological criterion for NAFLD diagnosis is macrovesicular fatty change in hepatocytes with displacement of the nucleus toward the cell edge.[15] Patients who had more than 5% of hepatocytes affected by macrovesicular steatosis were diagnosed as having either steatosis or NASH. The minimal criteria for the diagnosis of NASH were the presence of > 5% macrovesicular steatosis, inflammation, and liver cell ballooning, typically with predominantly centrilobular (acinar zone 3) distribution.[16, 17] The degree of steatosis was graded as follows based on the percentage of hepatocytes containing macrovesicular fat droplets: grade 0, no steatosis; grade 1, < 33% hepatocytes containing macrovesicular fat droplets; grade 2, 33–66% of hepatocytes containing macrovesicular fat droplets; and grade 3, > 66% of hepatocytes containing macrovesicular fat droplets.[18] The hepatitis activity (necroinflammatory grade) was also determined on the basis of the composite NAFLD activity score (NAS): the unweighted sum of the scores for steatosis, lobular inflammation, and hepatocellular ballooning (rangeing from 0 to 8).[19] Fibrosis severity was scored according to the method of Brunt[18] and was expressed on a 4-point scale as follows: 0, none; 1, perivenular and/or perisinusoidal fibrosis in zone 3; 2, combined pericellular portal fibrosis; 3, septal/bridging fibrosis; and 4, cirrhosis.

Clinical and laboratory evaluation

The weight and height of patients were measured using a calibrated scale after removing shoes and heavy clothing. Venous blood samples were obtained from subjects after overnight fasting (12 h) to measure plasma glucose, hemoglobin A1c (HbA1c), total cholesterol, high-density lipoprotein (HDL) cholesterol, triglycerides, serum AST, and ALT levels. All laboratory biochemical parameters were measured using conventional methods.

Targeted resequencing

Genomic DNA was extracted using Genomix (Talent Srl, Trieste, Italy), from blood samples collected from each subject. Genomic DNA of 28 randomly selected NAFLD patients was used for targeted resequencing. Clinical information of these 28 patients is shown in Supplementary

Table 1. The genomic region from 44,317,888 to 44,425,902 on chromosome 22, which includes *PNPLA3*, *SAMM50*, and *PARVB*, was amplified using region-specific primers with a long-range PCR approach (Supplementary Table 2). Amplification was performed using the GeneAmp® 9700 PCR System (Life Technologies, Carlsbad, CA, USA), with 50 ng of genomic DNA, 1 × PCR Buffer (TOYOBO, Osaka, Japan), 0.4 mM of each dNTP, 0.3 μM of each primer, and 0.02 U of KOD FX Neo (TOYOBO, Osaka, Japan) in a 14-μl reaction volume. After an initial denaturation at 94°C for 2 min, PCR was performed with 35 cycles, each consisting of 98°C for 10 s and 68°C for 5-8 min, depending on the length of the amplicons. The PCR extension time is shown in Supplementary Table 2. All 16 PCR amplicons were confirmed as a single peak (Supplementary Fig. 1), and the molar concentration was measured using an Agilent DNA 12000 Kit and 2100 Bioanalyzer (Agilent Technologies, Santa Clara, CA); the amplicons were then pooled at equal concentration for all individuals.

Pooled PCR products were shared using a Covaris E210 (COVARIS, INC, Woburn, MA) under the following conditions: 10% duty cycle, intensity of 5.0, 200 cycles per burst, 40-s duration, and frequency sweeping mode. Each sample was dual indexed and DNA libraries were prepared using the TruSeq™ DNA Sample Preparation kit v2 (Illumina, San Diego, CA, USA), according to the manufacturer's protocol. Sequencing was performed in a MiSeq system (Illumina, San Diego, CA, USA) using 150-bp paired-end reads. We aligned the paired-end reads to the human genome

(UCSC hg19) as a reference, using BWA (Version 0.5.9rc1; http://bio-bwa.sourceforge.net/).[20] For sequence data conversion, sorting, and indexing, we used SAMtools (Version 0.1.17; http://samtools.sourceforge.net/) and Picard (Version 1.72; http://picard.sourceforge.net).[21] The variants, including insertion/deletions and SNPs, were determined using GATK (version 1.6-5-g557da77; http://www.broadinstitute.org/gatk/).[22] ANNOVAR (Version 2012-05-25) was used to appropriately annotate genetic variants obtained.[23] The variations were confirmed using IGV (Supplementary Fig. 2) (version 1.5.65, http://www.broadinstitute.org/igv/).[24, 25]

Fine LD mapping of the *PNPLA3*, *SAMM50*, and *PARVB* loci

Invader probes (Third Wave Technologies, Madison, WI, USA) were constructed for 192 SNPs and 9 insertion/deletions located on chromosome 22:44,321,410 to 44,417,970, which had MAFs > 0.05, as estimated from the results of targeted resequencing. An invader probe for one insertion/deletion (rs67877195) could not be constructed. SNPs and insertion/deletions were genotyped using Invader assays, as previously described.[26] Among the 200 variations, 173 SNPs and 7 insertion/deletions were successfully genotyped. The success rates of the 180 Invader assays were > 99.0% and the concordance rate of these results with those of sequencing was > 99.4%.

Statistical analysis

LD was drawn using HaploView.[27] We categorized the genotypes as 0, 1, or 2, depending on the number of copies of risk alleles present. Odds ratios (ORs) and *P*-values, adjusted for age, sex, body mass index (BMI), and the presence of type 2 diabetes mellitus, were calculated using multiple logistic regression analysis. Multiple linear regression analyses were performed to test the independent effect per allele of each SNP on biochemical traits and histological parameters, accounting for effects of the other variables (i.e., age, sex, BMI and the presence of type 2 diabetes mellitus). BMI, AST, and ALT values were logarithmically transformed before performing multiple linear and logistic regression analyses. Statistical analyses were performed using PLINK 1.07 (http://pngu.mgh.harvard.edu/purcell/plink)[28] and R software (http://www.r-project.org/). *P*-values less than 3.0×10^{-4} (0.05/169) was considered to be significant.

Results

Targeted resequencing

GWAS indicated that a strong NAFLD susceptibility locus in present in the region from 4.3-kb downstream of the *PNPLA3* (NM_025225.2) transcription start site to 7.5-kb downstream of the *PARVB* isoform a (NM_001003828.2) transcription start site.[11, 12, 14] We amplified the approximately 100-kb genomic region, from 1.7-kb upstream of *PNPLA3*, to 30-kb downstream of the *PARVB* isoform a transcription start site, using long-range PCR (3.8–13.6 kb, Supplementary Table 2). Sixteen PCR products covered the entire genomic region.

PCR amplicons prepared from 28 NAFLD patients were sequenced using indexed multiplex next-generation sequencing. The average depth of the individual sequencing ranged from 387 to 652. An example of this sequencing is shown in Supplementary Fig. 1. All observed variations are listed in Supplementary Table 3. A total of 329 variations were found and most of these (325 variations) were already registered in the dbSNP database. Insertion/deletions accounted for 16 variations, and SNPs for 313. Four novel SNPs were found in this study (ss831884188, ss831884189, ss831884190, and ss831884191). No clear genomic structural variations (> 50 nucleotides in length) were observed. A 13-nucleotides insertion/deletion (rs140963094) was the longest variation.

Fine variation LD mapping

According to the HapMap database, SNPs from rs58002102 (chromosome 22:44,321,410) to rs135114 (chromosome 22:44,417,970) were sufficient to produce a fine LD map in the NAFLD-susceptibility genomic region. There were 280 variations in this region (Supplementary Table 3), including 192 SNPs and 9 insertion/deletions with minor allele frequencies (MAF) > 0.05 in the 28 NAFLD patients. The latter 201 variations with MAF > 0.05 were genotyped in 540

NAFLD patients and 1012 control subjects using Invader assays; 173 SNPs and 7 insertion/deletions (rs5845621, rs7128095, rs71313378, rs140963094, rs1065207, rs76409096 and rs34505405) were successfully identified. Genotyped variations and their allele frequencies are shown in Supplementary Table 3 and 4.

We used 162 SNPs and 7 insertion/deletions that had MAFs > 0.10 for further analysis. Fine LD mapping using 169 variation data derived from 540 NAFLD patients is shown in Fig. 1 and r^2 values in control and NAFLD subjects are given in Supplementary Fig. 2. HaploView analysis showed that four LD blocks existed in the NAFLD-susceptibility genomic region in this population: a 1-kb LD block 1 (rs738407 to rs2006943), a 21-kb LD block 2 (rs139051 to rs13054885), a 48-kb LD block 3 (rs7289329 to rs1004863), and a 2-kb LD block 4 (rs5794455 to rs6006611). LD block 1 and block 2 occurred within *PNPLA3*, block 3 within *SAMM50*, and block 4 within *PARVB* (Fig. 1). LD blocks were the same in the NAFLD patients and control subjects (Supplementary Fig. 2). Seven insertion/deletions were in LD with the SNPs.

Association of variations with severity of NAFLD

First, we examined the association of the above 169 variations with simple steatosis and NASH. Clinical characteristics of the simple steatosis and NASH patients are shown in Table 1. We performed multiple logistic regression analysis using genotypes, age, sex, BMI, and the presence of type 2 diabetes as independent variables. Two SNPs, viz., rs6006610 ($P = 6.1 \times 10^{-5}$) and rs6006611 ($P = 7.1 \times 10^{-6}$) in LD block 4, and rs2006943 ($P = 5.6 \times 10^{-5}$) in LD block 1, were significantly associated with NASH as compared to simple steatosis (Fig. 2, Supplementary Table 4). Relatively high ORs were observed: rs6006611, 2.68 (1.74-4.12); rs6006610, 2.37 (1.55-3.62); rs2006943, 2.54 (1.62-4.00) (OR [95% confidence interval]). Since the sample size of simple steatosis is small (n = 52), we compared 540 NAFLD patients and 488 NASH patients to 1012 control subjects. As reported previously, most of variations in LD blocks 1 to 4 were significantly associated with NAFLD (Fig. 2, Supplementary Table 4). Stronger association and higher ORs between NASH and control individuals were observed in LD block 1 to 4, especially in block 4 (Fig. 2). The risk allele frequencies of these SNPs were highest in the NASH group, and those of the simple steatosis and control group were very similar (Supplementary Table 4). No associations were observed for the simple steatosis and control groups ($P > 0.02$). These data suggested that the variations in LD block 4 are more strongly associated with NASH, rather than with NAFLD and simple steatosis.

Next, we examined the association of the 169 variations with histological phenotypes. Linear regression analysis, adjusted for age, sex, BMI, and the presence of type 2 diabetes, revealed that no variations were significantly associated with lobular inflammation (Fig. 3, Supplementary Table 5). Only one SNP (rs12484700) was significantly associated with steatosis grade (P = 2.2 ×

10^{-4}). Two SNPs (rs6006610, $P = 1.9 \times 10^{-4}$; rs6006611, $P = 4.4 \times 10^{-5}$) in LD block 4 were significantly associated with hepatocyte ballooning. Many variations in LD blocks 2, 3, and 4 were associated with a higher NAS (Fig. 3, Supplementary Table 5). The most significant variation was rs6006611 ($P = 3.4 \times 10^{-6}$) in LD block 4. Only rs734561 ($P = 2.6 \times 10^{-4}$) and rs2006943 ($P = 1.9 \times 10^{-4}$) in LD block 1 were significantly associated with a higher fibrosis stage (Fig. 3, Supplementary Table 5).

Finally, we investigated the association of these variations with AST and ALT levels. We observed that many of the variations in LD block 2 were significantly associated with both AST and ALT levels (Fig. 4, Supplementary Table 5). Many variations in LD blocks 1, 3, and 4 were also significantly associated with AST and ALT levels; however, these associations were much stronger with variations in LD block 2.

DISCUSSION

After the first report of an association of *PNPLA3* rs738409 with NAFLD,[9] many replication studies were performed in various populations,[10-14, 29, 30] verifying the importance of rs738409 in the development of NAFLD. The LD block containing rs738409 spans approximately 80 kb in the Japanese population. Many variations in the LD block containing rs738409 are registered in the dbSNP database; however, many of these were invalid, and no genomic structural variations were reported. Therefore, we performed targeted resequencing to identify and confirm variations in this region. We did not find any genomic structural variations in this region. For sequencing, only 28 NAFLD subjects were used; it is therefore possible that genomic structural variations may occur in this region at a low frequency. Using a combination of targeted resequencing and genotyping methods, we determined the frequencies and the associations of most common variations in this region, including insertion/deletions, with the severity of NAFLD. This approach would be useful for investigating other common disease susceptibility loci in detail.

Fine LD mapping revealed that 4 LD blocks covered the NAFLD-susceptibility locus and that *PNPLA3* was contained in LD blocks 1 and 2, *SAMM50* in LD block 3, and *PARVB* in LD block 4. Since LD blocks were separated clearly by genes, the genetic effect of each gene on the development and progression of NAFLD could be analyzed. In this study, we showed that many variations in *PNPLA3* (LD blocks 1 and 2), as well as rs738409 in LD block 2, were significantly associated with NASH, and with the severity of NAFLD (NAS, AST, and ALT). These associations were stronger with the 5′-region of LD block 2. Fibrosis was significantly associated with variations in LD block 1, which did not contain rs738409. The variant, rs738409, is a C (non-risk allele) to G (risk allele) substitution that changes codon 148 from isoleucine (I) to methionine (M). Interestingly, *PNPLA3*-deficient mice did not show a fatty liver,[31, 32] but hepatic overexpression of *PNPLA3*^{I148M} led to development of a fatty liver, although overexpression of wild type *PNPLA3* in mouse liver did not.[33] Our study and other studies in mice suggest that variations in LD with rs738409 and/or variations in LD block 1 of *PNPLA3* could increase the transcriptional level of mRNA containing the risk allele of rs738409, leading to the development of NAFLD. LD block 2 contains the insertion/deletion rs71518095 that is located in intron 5 of *PNPLA3*, near exon 6 (pairwise LD statistics r^2 = 0.93 with rs738409). The effect of the insertion/deletion would affect transcription of mRNA more strongly.

Overexpression of *PNPLA3*^{I148M} in mice led to development of fatty liver, but not to NASH and metabolic disorders,[33] suggesting the contribution of other genes to the latter conditions. In our study, the strongest associations were observed between variations in *PARVB* (LD block 4) and NASH, and histological severity (NAS). *PARVB* has at least four transcript variants; LD block 4 is located in the 2nd intron of the longest transcript variant of *PARVB*, corresponding to the 5′-flanking region of the shorter transcript variants. *PARVB* encodes parvin-β, which forms part of an integrin-linked kinase–pinch–parvin complex that transmits signals from integrin to Akt/protein kinase B (PKB).[34] Overexpression of parvin-β increases mRNA expression levels, phosphorylation at serine 82, and activity of the peroxisome proliferator-activated receptor γ (PPARγ), leading to a concomitant increase in lipogenic gene expression.[35] Another report has indicated that overexpression of parvin-β promotes apoptosis.[36] Increased lipogenesis and apoptosis are considered to underlie fibrosis in NAFLD[37, 38]; therefore, variations in *PARVB* (LD block 4) could increase the transcriptional level of parvin-β, leading to increased lipogenesis and apoptosis, resulting in the progression of fibrosis.

In conclusion, both our previous GWAS and the present study indicate that *PNPLA3* is most important in the development of simple steatosis. We also showed here that *PARVB*, in addition to *PNPLA3*, plays an important role in the progression of simple steatosis to NASH. The limitation of this study was a small sample size of individuals with simple steatosis, therefore, further studies would be necessary. Nevertheless, the approach used here of a combination of targeted resequencing and genotyping methods could be applied for the detailed investigation of other common disease susceptibility loci.

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Figure legends

Fig. 1 Fine linkage disequilibrium (LD) mapping around *PNPLA3*, *SAMM50*, and *PARVB*.

LD coefficients (r^2) between every pair of variations were calculated. LD blocks are shown in red triangles; genomic structure is shown on top.

Fig. 2 Regional plots of the $-\log_{10}$(*P*-value) for the association of variations.

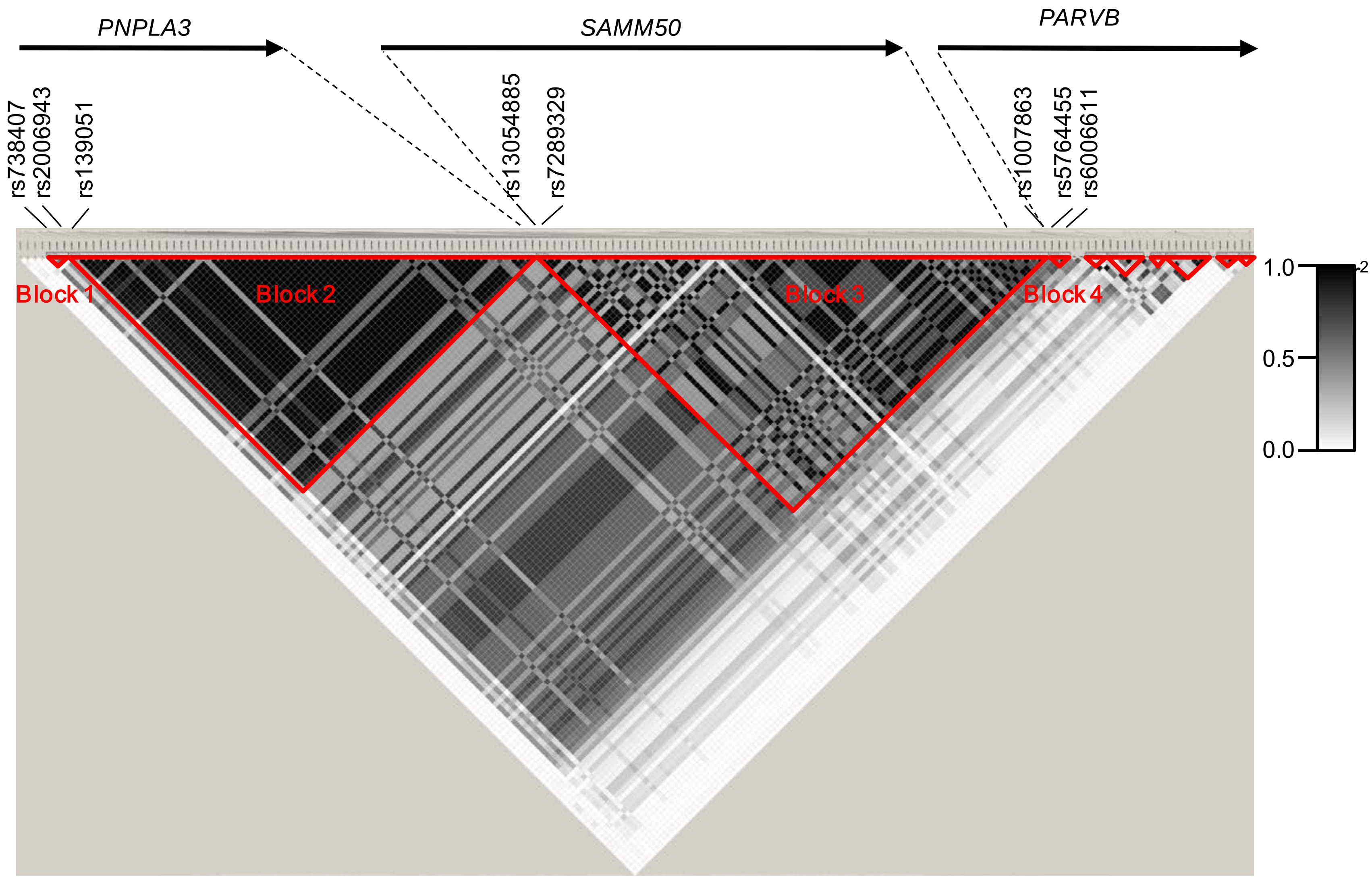
Variations are plotted by their position on chromosome 22 against their association with NASH compared to simple steatosis, NAFLD to control, and NASH to control. Data were derived by logistic regression analysis, adjusted for age, sex, logarithmically transformed body mass index (BMI), and the presence of type 2 diabetes. The positions of genes as well as the direction of transcription are shown above the plots. Black, red, blue, and green closed circles are variations in LD block 1, 2, 3, and 4, respectively. Gray closed circles are variations in other LD blocks.

Fig. 3 Regional plot for histological scores.

Data were derived by linear regression analysis for individual histological scores for steatosis grade, lobular inflammation, hepatocyte ballooning, NAFLD activity score (NAS), and fibrosis stage. Each phenotype was adjusted for age, sex, logarithmically transformed body mass index (BMI), and the presence of type 2 diabetes. The positions of genes as well as the direction of transcription are shown above the plots. Black, red, blue, and green closed circles are variations in LD block 1, 2, 3, and 4, respectively. Gray closed circles are variations in other LD blocks.

Fig. 4 Regional plot for aspartate aminotransferase (AST) and alanine aminotransferase (ALT). Data were derived by linear regression analysis. Values of AST and ALT levels were logarithmically transformed. Each phenotype was adjusted for age, gender, logarithmically transformed body mass index (BMI), and the presence of type 2 diabetes. The positions of genes as well as the direction of transcription are shown above the plots. Black, red, blue, and green closed circles are variations in LD block 1, 2, 3, and 4, respectively. Gray closed circles are variations in other LD blocks.

Fig. 1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PARVB
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rs2006943
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rs13054885
rs7289329
rs1007863
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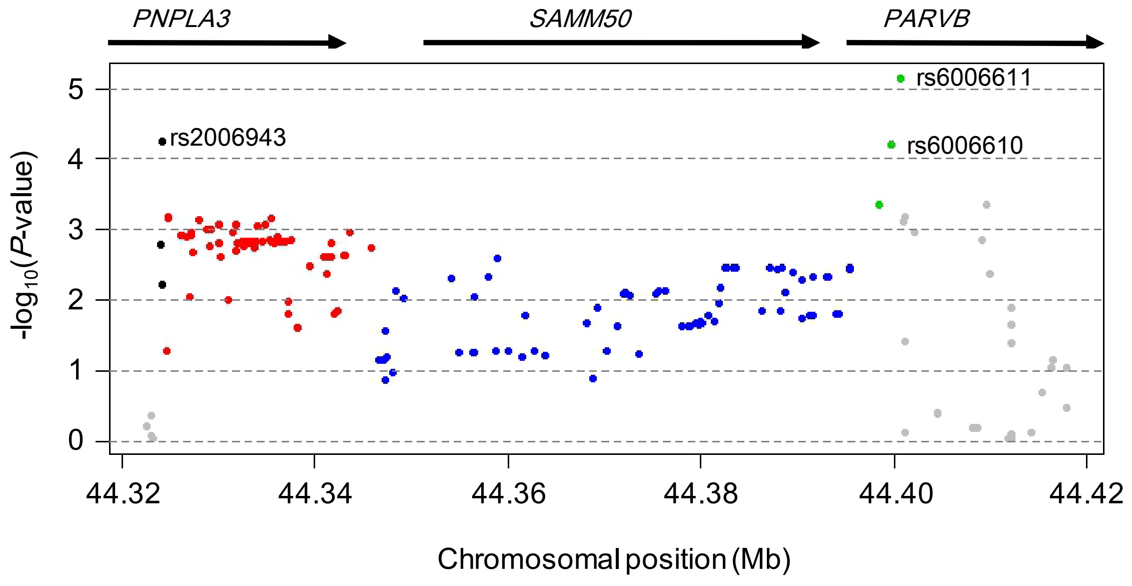
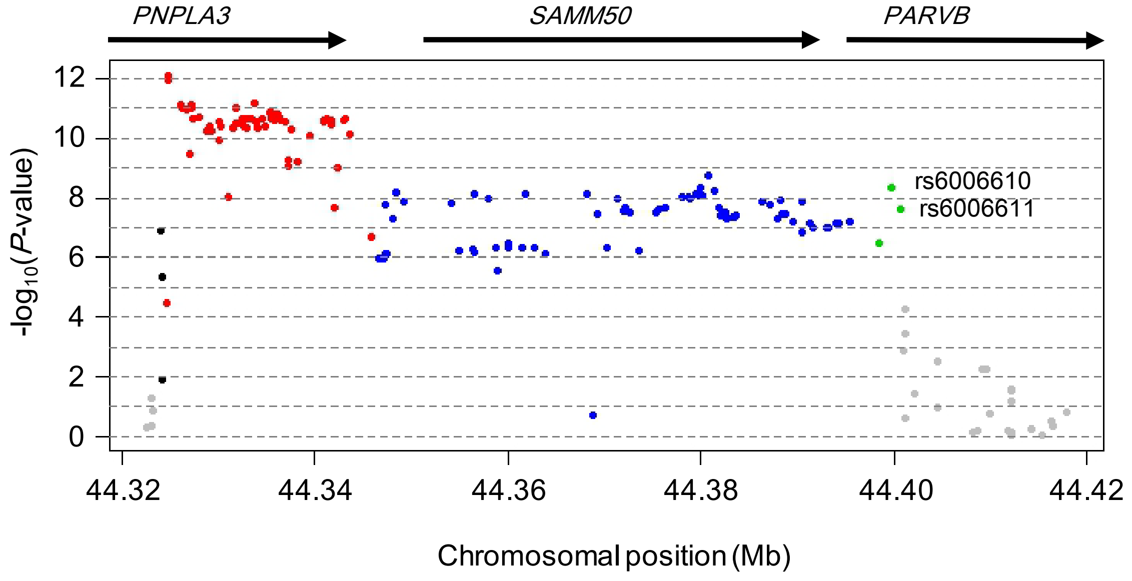
rs6006611
Block 1
Block 2
Block 3
Block 4
1.0
0.5
0.0
r2

Fig. 2

NASH vs. simple steatosis



NAFLD vs. control



NASH vs. control

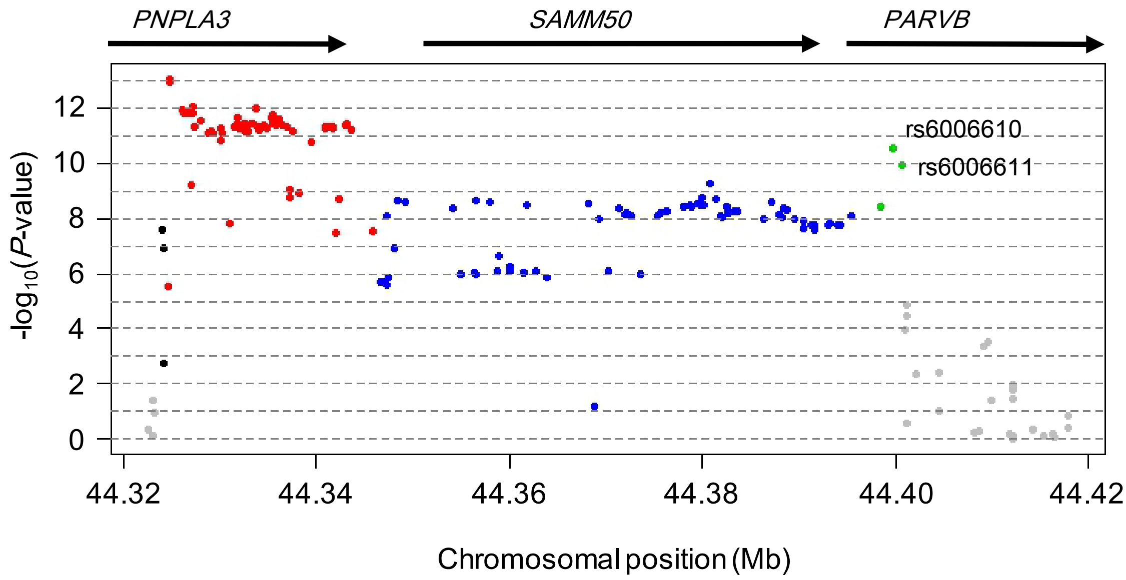
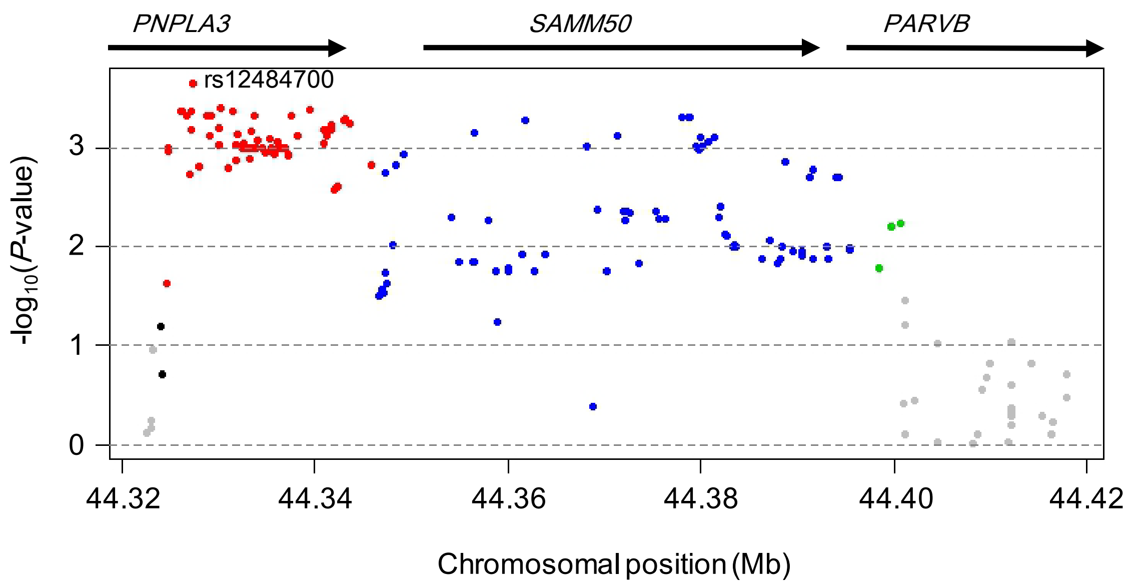
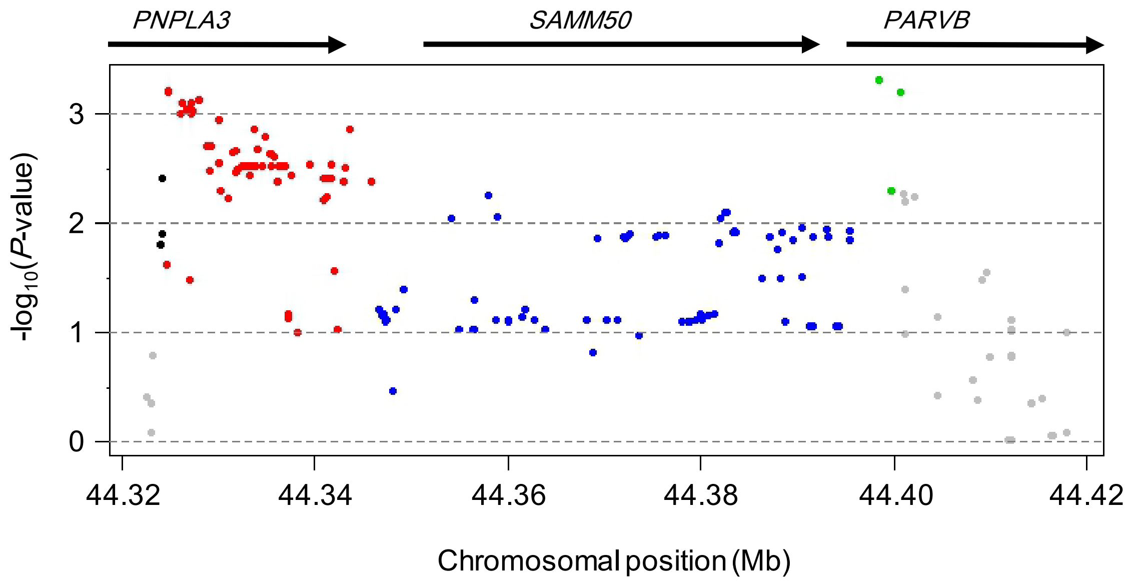


Fig. 3

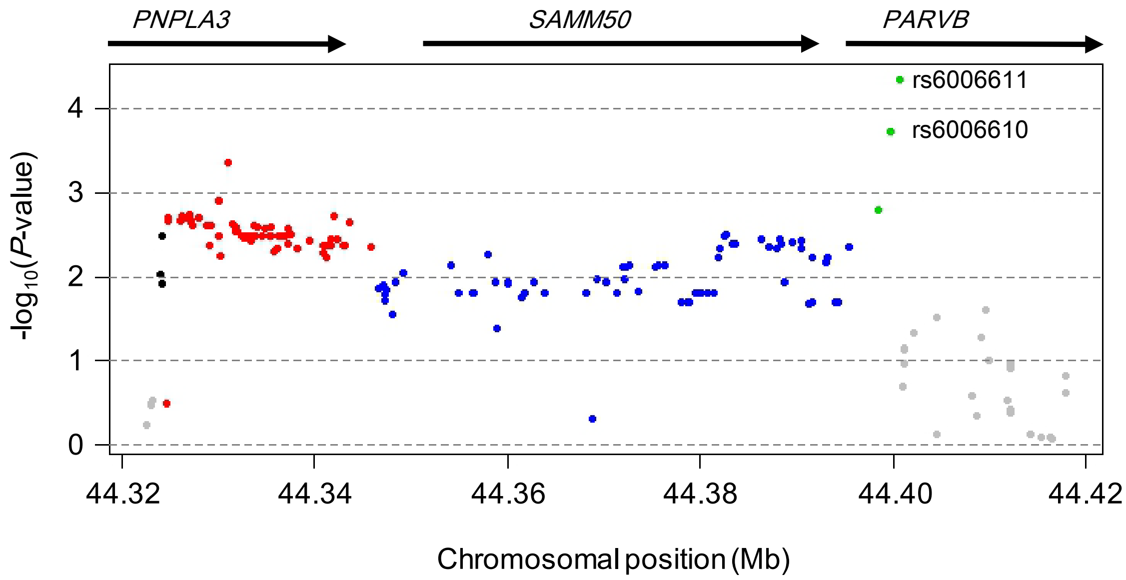
Steatosis grade



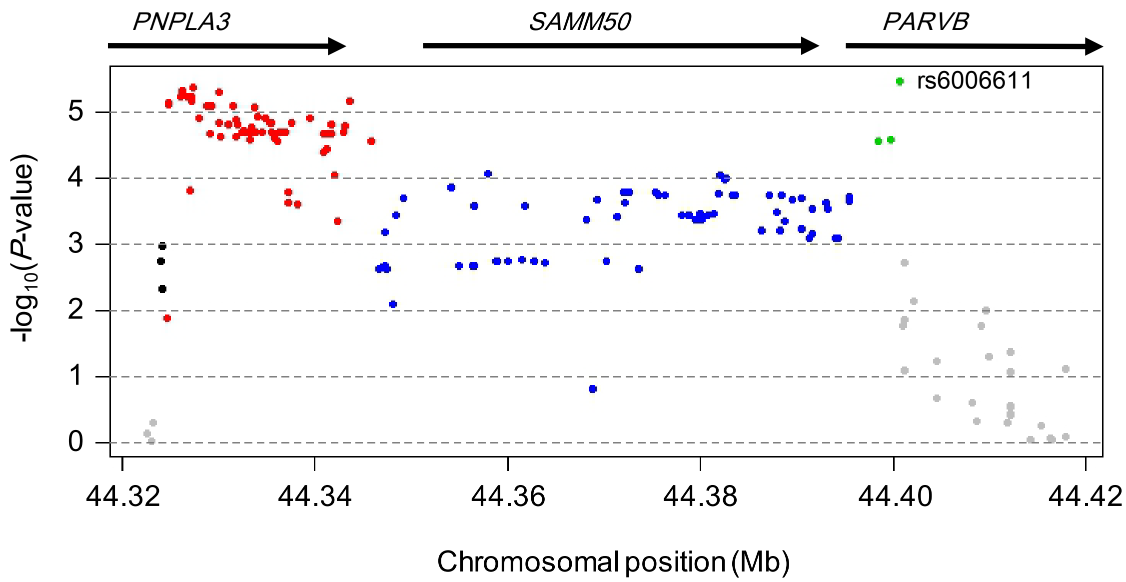
Lobular inflammation



Hepatocyte ballooning



NAS



Fibrosis stage

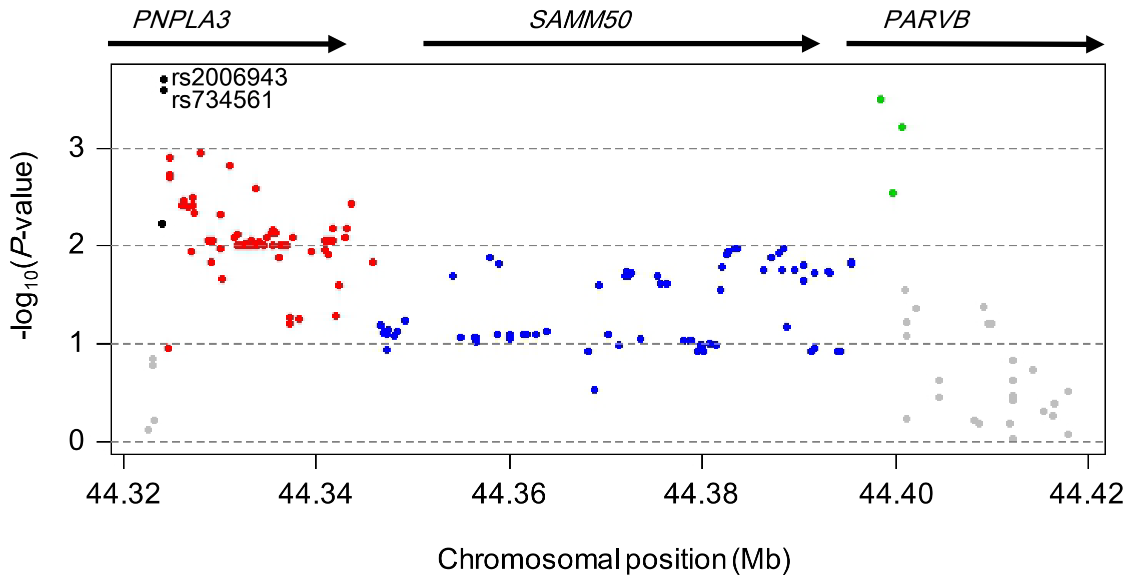
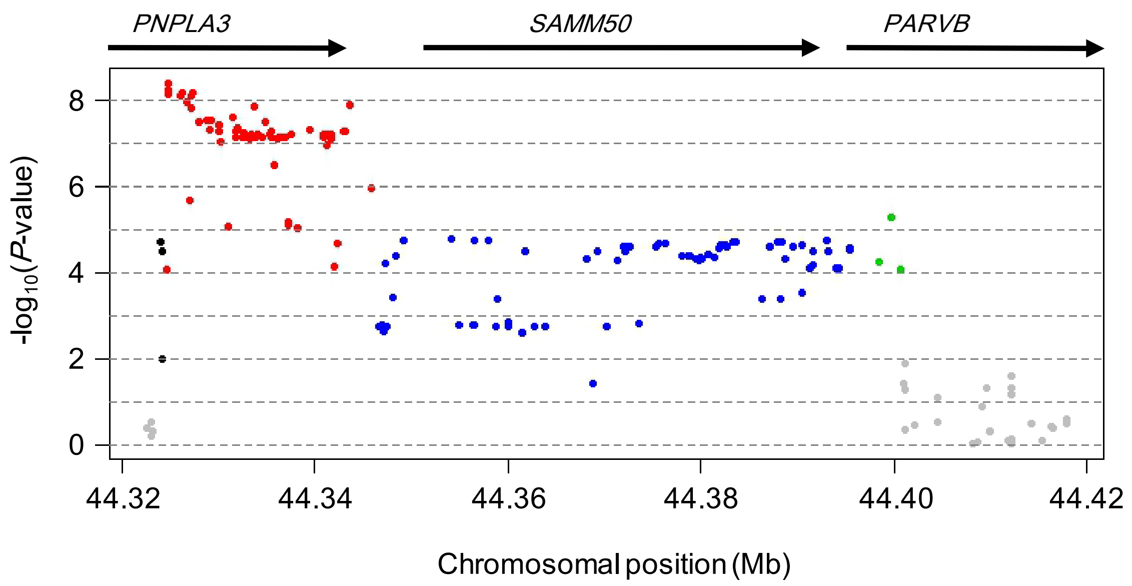


Fig. 4

AST


PNPLA3
SAMM50
PARVB
-log10(P-value)
0
2
4
6
8
44.32
44.34
44.36
44.38
44.40
44.42
Chromosomal position (Mb)

ALT

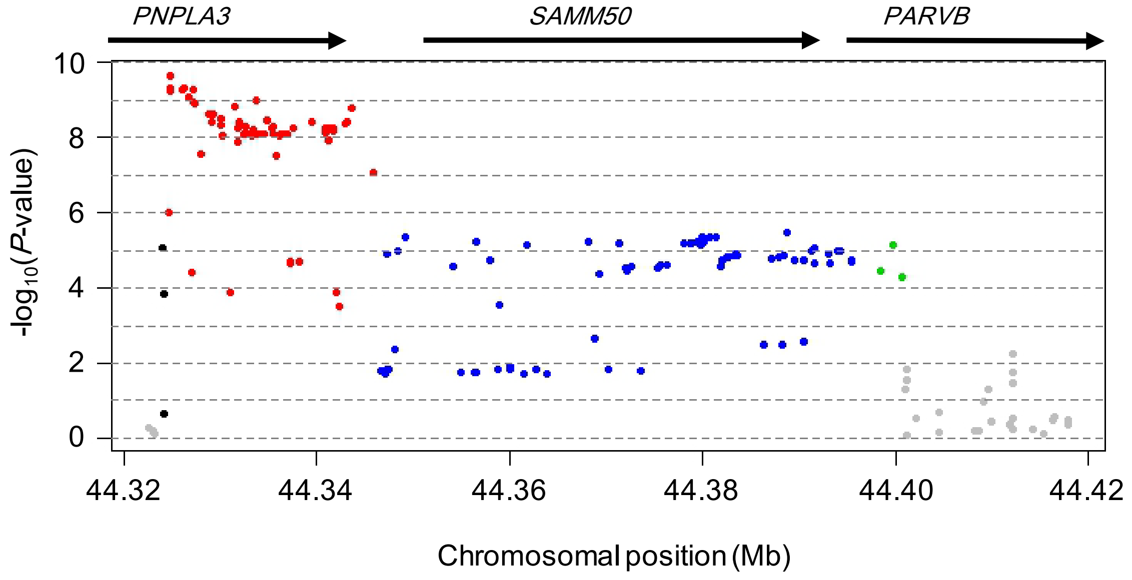
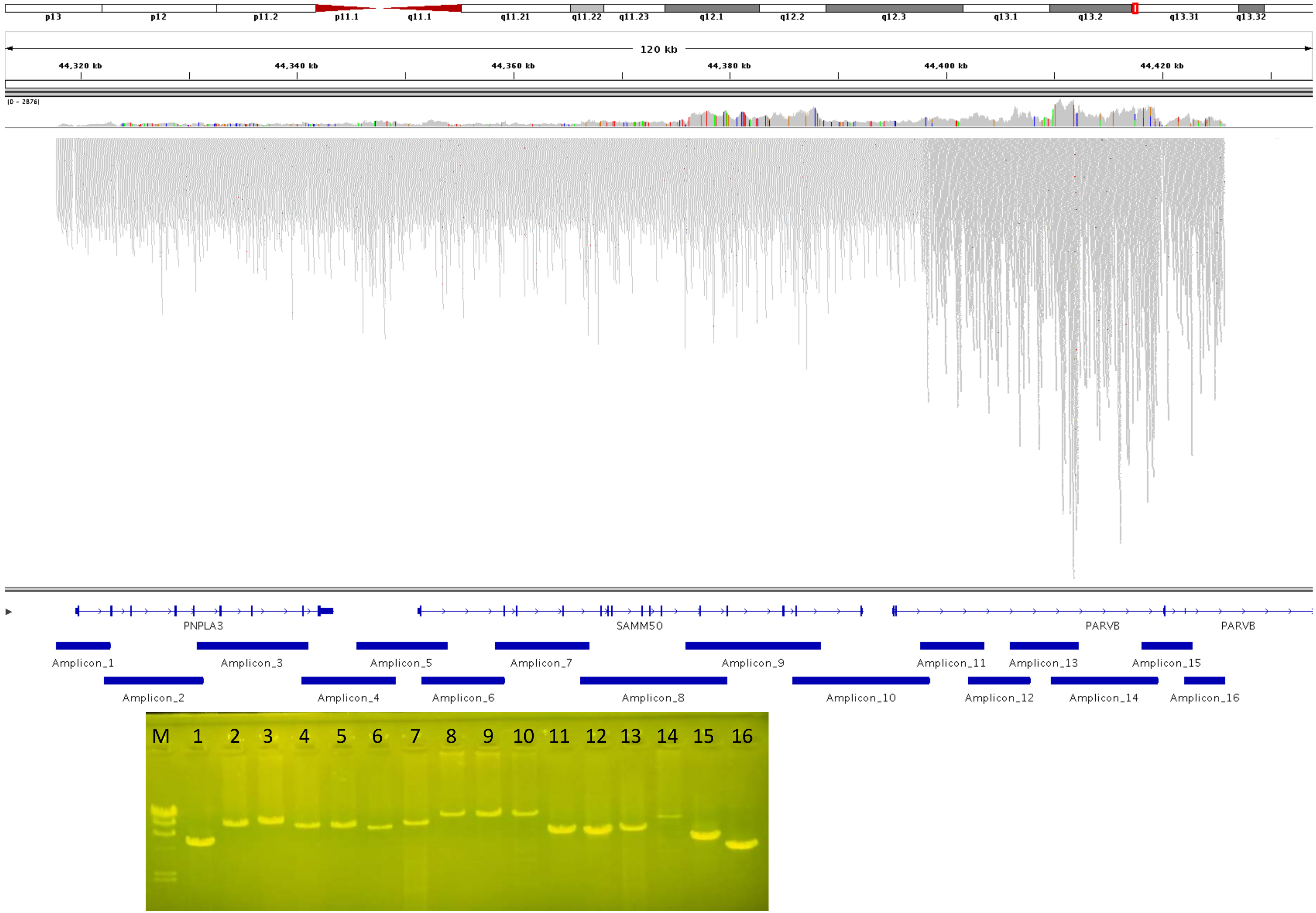

PNPLA3
SAMM50
PARVB
-log10(P-value)
0
2
4
6
8
10
44.32
44.34
44.36
44.38
44.40
44.42
Chromosomal position (Mb)

Table 1 Clinical characteristics of subjects

	Simple Steatosis	NASH	Control
n	52	488	1012
Men/Women	21/31	264/224	500/512
Type2 diabetes (%)	22 (42.3%)	228 (46.7%)	66 (6.5%)
Age (year)	51.4 ± 15.6	50.5 ± 14.1	53.1 ± 15.3
BMI (kg m-^{2})	25.1 ± 3.5	28.4 ± 5.0	22.7 ± 3.2
Plasma glucose (mg dL^{-1})	115 ± 32	118.9 ± 36.5	98.2 ± 19.0
Hb.A1c (%)	6.3 ± 1.3	6.4 ± 1.3	5.5 ± 0.7
Total cholesterol (mg dL^{-1})	213.4 ± 39.5	212.3 ± 39.3	208.5 ± 36.2
Triglycerides (mg dL^{-1})	158.5 ± 80.3	167.9 ± 107.6	110.0 ± 88.5
HDL-cholesterol (mg dL^{-1})	55.5 ± 14.8	52.6 ± 14.8	62.7 ± 15.5
SBP (mmHg)	125.5 ± 15.5	128.6 ± 14.5	124.5 ± 19.1
DBP (mmHg)	76.6 ± 12.8	78.9 ± 11.3	76.3 ± 11.6
AST (IU L^{-1})	29.8 ± 11.9	52.3 ± 30.4	23.0 ± 10.2
ALT (IU L^{-1})	43.9 ± 23.8	84.9 ± 57.3	20.3 ± 11.8
Steatosis grade (1-3)	1.3 ± 0.5	1.6 ± 0.7	–
Lobular inflammation (0-3)	–	1.4 ± 0.7	–
Hepatocyte ballooning (0-2)	–	1.2 ± 0.6	–
NAS (0-8)	–	4.3 ± 1.4	–
Fibrosis stage (0-4)	–	1.9 ± 0.9	–

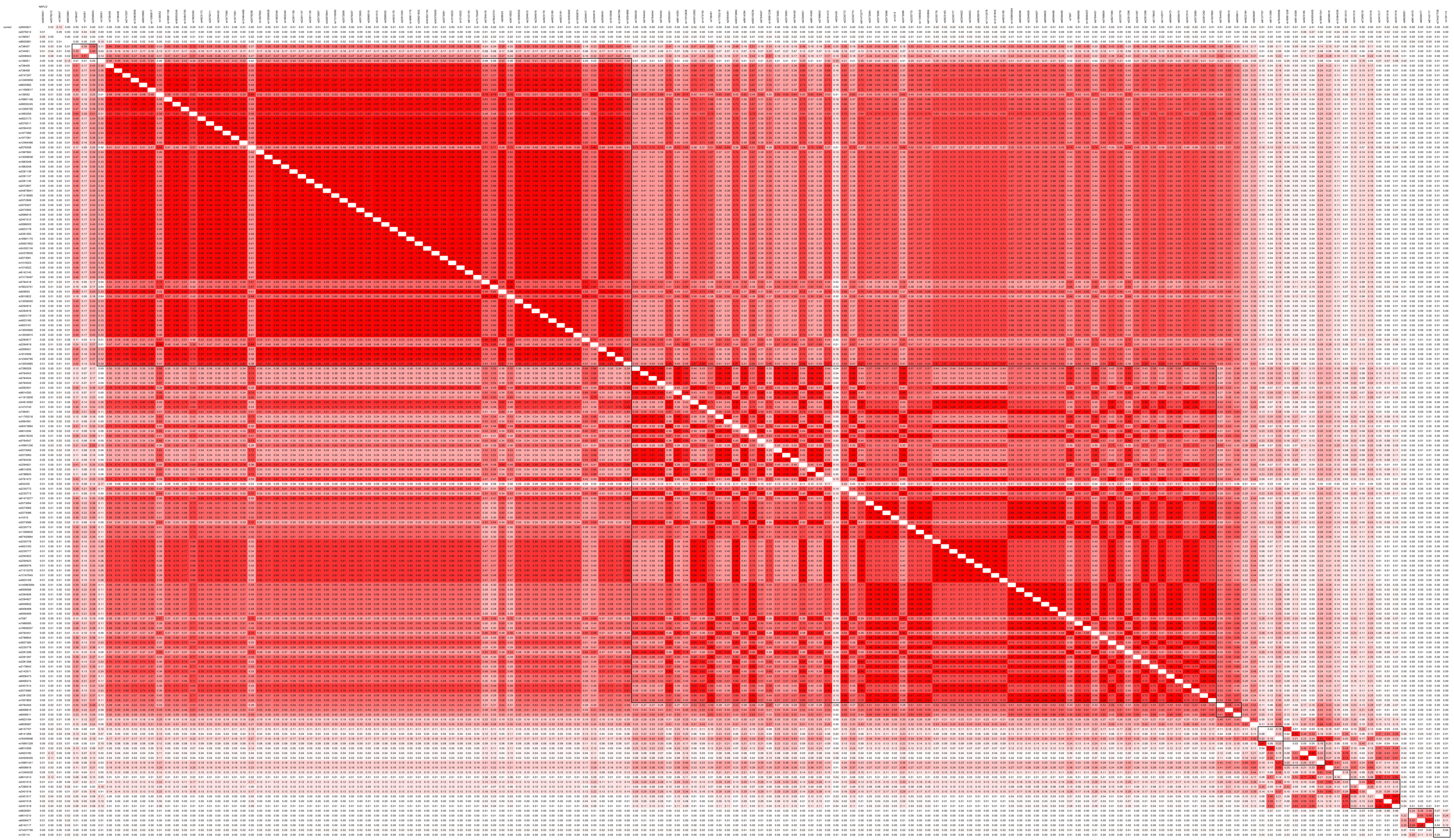
Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; DBP, diastolic blood pressure; HDL, high density lipoprotein; NAS, NAFLD activity score; SBP, systolic blood pressure.

Values are shown as the mean ± s.d.



Supplementary Fig. 1 Example of sequencing results

Upper, results of IGV and the location of PCR amplification products. Lower, gel electrophoresis of PCR products. M, molecular size maker (λ-Hind III digest), numbers from 1 to 16 indicate amplicon-1 to amplicon-16.



Supplementary Fig. 2 Linkage disequilibrium (LD) map constructed using plink and HaploView in NAFLD and control subjects

Supplementary Table 1 Clinical characteristics of 28 NAFLD patients

	Subjects
n	28
Men/Women	8 / 20
Type2 diabetes (%)	12 (42.9 %)
Age (year)	55.9 ± 11.8
BMI (kg m-^{2})	27.7 ± 6.1
Plasma glucose (mg dL^{-1})	114.9 ± 22.4
Hb.A1c (%)	6.3 ± 0.9
Total cholesterol (mg dL^{-1})	221.7 ± 46.7
Triglycerides (mg dL^{-1})	144.9 ± 74.1
HDL-cholesterol (mg dL^{-1})	58.4 ± 14.6
SBP (mmHg)	135.6 ± 11.4
DBP (mmHg)	84.4 ± 12.5
AST (IU L^{-1})	49.1 ± 19.8
ALT (IU L^{-1})	71.9 ± 31.8
Steatosis grade (1-3)	1.8 ± 0.8
Lobular inflammation (0-3)	1.4 ± 0.6
Hepatocyte ballooning (0-2)	1.1 ± 0.7
NAS (0-8)	4.4 ± 1.3
Fibrosis stage (0-4)	1.7 ± 0.9

Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; DBP, diastolic blood pressure; HDL, high density lipoprotein; NAS, NAFLD activity score; SBP, systolic blood pressure.

Values are shown as the mean ± s.d.

Supplementary Table 2 PCR primers, estimated amplicon size, and extension time used for amplification of the genomic region including *PNPLA3*, *SAMM50*, and *PARVB*

PCR amplicon	Forward Primer	Sequence	Reverse Primer	Sequence	Length (bp)	Extension time (min)
1	F09	TCAGCCCAGGTATTCACTAAGGCCT	R07	AGACCCTGTCGGAGGAACTTGCTTA	5058	5
2	F12	TCCTGCACCTGATAGCATTAAGGCC	R15	CATGCCTAAGGCGCTCCTACTTATC	9209	8
3	F20	AGCTCGACCTCTTGTGACCCTTAGT	R22	ACCCCGGAGACTGTGACTCAGTACA	10323	8
4	F26	ACTGGTGACATGGCTTCCAGATATG	R26	AACCATGCCATGGCAATCAGCGATC	8696	5
5	F30	TAGGAGACCATGGGACGTATTTTCT	R30	GAAGCCCATCCAAATGCAGGGGATA	8470	5
6	F34	CAGACCTTCGAGCAGGAACCTGATA	R33	ACATCTCCCTAGTGGTGTATGGAAG	7698	5
7	F38	ATGCTTTCGAGTCCATTTTGTGAGC	R39	GACATCTAGACGCATCTGGGCAACT	8752	5
8	F43	CCGTGTCCTCATTCCAGTATTGGAG	R46	AGTGAGACGCGAGCCTTCTAGACTT	13629	8
9	F51	CCACCAGTCTAACACATGTATGCTG	R52	GCAACAGTCACCATCATGATCGTCC	12494	8
10	F57	TGAGAAGGCGTGGCTCATTCTGGAT	R60	TCCCACGGTTCACTACGCAAACTGA	12698	8
11	add_F03	TTCCATGAACACAGCGGCAATTCAG	add_R02	GGTTCAGCTTCGGAATGAAAGAGTT	5979	5
12	add_F04	CCAAGTGTAGTGCAGGAATCTGACG	add_R03	TTGAAACATGCCAGGACCTCTTAGG	5750	5
13	add_F05	AATGTAAGCTCCGCAGAGGAGGTCT	add_R04	GGATGATGTGTTATTGAAGTGGCCT	6390	8
14	add_F06	GCCTGGCTCGGTGTAACTTCTATTG	add_R06	TTGTCCCTACCCACGGGAAGCTTAG	9956	8
15	add_F08	AAGGGCATTTGATCCTTGTTCCAGG	add_R07	CTCCCGTAGCACATCAGCCTTAATC	4746	5
16	add_F09	AAATGCACCAAGAATTCCGGTAGCA	add_R09	AATTCTCGGTTGCTGGTTTAGAGCT	3783	5

Supplementary Table 3 Variations observed in 28 NAFLD individuals by targeted resequencing

Chr.	Position (build 37.2)	dbSNP ID	Reference allele	Variation	Frequency of variation	
					Sequencing (n = 28)	Typing (n = 540)
22	44,321,410	rs58002102	G	T	0.04	N.D.
22	44,322,401	rs190928670	C	T	0.02	N.D.
22	44,322,586	**rs5845621**	CTAA	C	0.21	0.39
22	44,322,665	rs141460550	G	C	0.04	N.D.
22	44,322,843	rs147412464	T	C	0.04	N.D.
22	44,322,862	rs200528261	C	T	0.02	N.D.
22	44,322,922	rs2076213	T	G	0.02	N.D.
22	44,322,970	**rs2076212**	G	T	0.09	0.10
22	44,323,074	**rs139047**	G	A	0.54	0.44
22	44,323,219	**rs9625961**	A	G	0.09	0.16
22	44,323,294	rs139663621	C	T	0.07	N.S.
22	44,323,955	**rs738407**	T	C	0.75	0.71
22	44,324,104	**rs734561**	C	T	0.48	0.40
22	44,324,171	rs738410	C	T	0.05	N.D.
22	44,324,181	**rs2006943**	G	A	0.63	0.56
22	44,324,676	**rs139051**	A	G	0.07	0.22
22	44,324,727	**rs738409**	C	G	0.68	0.60
22	44,324,730	**rs738408**	C	T	0.68	0.60
22	44,324,855	**rs3747207**	G	A	0.68	0.60
22	44,325,516	rs12485100	G	T	0.68	N.S.
22	44,325,565	rs12484801	C	T	0.68	N.S.
22	44,325,631	rs12484809	C	T	0.68	N.S.
22	44,325,748	rs6006585	A	G	0.07	N.S.
22	44,325,996	**rs12483959**	G	A	0.68	0.60
22	44,326,204	rs117414666	C	T	0.05	N.D.
22	44,326,272	**rs9625962**	T	C	0.68	0.60
22	44,326,700	**rs11090617**	C	T	0.68	0.59
22	44,327,012	**rs139052**	C	A	0.68	0.73
22	44,327,067	**rs77236970**	T	C	0.07	0.04
22	44,327,179	**rs16991158**	G	A	0.68	0.60
22	44,327,192	**rs36055245**	A	G	0.68	0.60
22	44,327,273	**rs12484700**	A	G	0.68	0.60

22	44,328,043	**rs1883350**	T	C	0.68	0.63
22	44,328,730	**rs4823173**	G	A	0.68	0.59
22	44,329,078	**rs2076211**	C	T	0.68	0.59
22	44,329,275	**rs2294433**	G	A	0.68	0.59
22	44,330,031	**rs1977080**	C	T	0.68	0.59
22	44,330,128	**rs1977081**	T	C	0.68	0.59
22	44,330,213	**rs12484466**	A	G	0.43	0.60
22	44,330,684	**rs59312329**	C	T	0.11	0.05
22	44,331,060	**rs2076208**	G	C	0.68	0.77
22	44,331,187	rs117377334	T	A	0.02	N.D.
22	44,331,513	**rs1997693**	C	G	0.68	0.59
22	44,331,778	**rs13056638**	C	G	0.68	0.59
22	44,331,815	**rs1883348**	C	G	0.68	0.59
22	44,331,943	**rs1883349**	G	A	0.68	0.59
22	44,332,477	**rs2281138**	T	C	0.68	0.59
22	44,332,493	**rs2281137**	T	C	0.68	0.59
22	44,332,570	**rs2281135**	G	A	0.68	0.59
22	44,332,653	**rs2072907**	C	G	0.68	0.59
22	44,332,685	rs4823175	A	T	1.00	N.D.
22	44,332,878	**rs34879941**	C	T	0.68	0.59
22	44,332,888	**rs71218095**	T	TC	0.68	0.59
22	44,333,172	**rs2072906**	A	G	0.68	0.59
22	44,333,370	**rs2076207**	A	G	0.68	0.59
22	44,333,479	**rs2072905**	C	G	0.68	0.59
22	44,333,694	**rs2896019**	T	G	0.68	0.60
22	44,333,945	**rs2401512**	C	G	0.68	0.59
22	44,333,968	**rs2896020**	T	C	0.68	0.59
22	44,334,476	**rs4823176**	T	C	0.68	0.59
22	44,334,486	rs4823177	T	C	0.68	N.S.
22	44,334,529	rs4823178	T	C	0.70	N.S.
22	44,334,842	**rs2281293**	T	C	0.68	0.59
22	44,335,331	**rs16991175**	T	C	0.68	0.59
22	44,335,406	**rs35621602**	C	A	0.68	0.59
22	44,335,416	**rs34352134**	C	T	0.68	0.59
22	44,335,421	**rs145772939**	G	A	0.07	0.08
22	44,335,453	**rs34376930**	G	T	0.68	0.59

22	44,335,670	rs35514853	TGG	T	1.00	N.D.
22	44,335,744	**rs2073081**	T	C	0.68	0.59
22	44,336,098	**rs1010023**	T	C	0.68	0.59
22	44,336,238	rs191860130	T	C	0.02	N.D.
22	44,336,310	**rs1010022**	A	G	0.68	0.59
22	44,336,496	**rs8142145**	T	C	0.68	0.59
22	44,336,562	rs137991731	G	A	0.02	N.D.
22	44,336,957	**rs73176497**	G	A	0.68	0.59
22	44,337,174	ss831884188	C	T	0.04	N.D.
22	44,337,184	**rs5764416**	T	G	0.16	0.31
22	44,337,189	**rs78023701**	T	C	0.16	0.31
22	44,337,533	**rs926633**	G	A	0.68	0.59
22	44,338,134	**rs3810622**	T	C	0.32	0.30
22	44,339,526	**rs13056555**	C	G	0.68	0.59
22	44,340,086	rs36069781	C	T	0.68	N.S.
22	44,340,904	**rs2294915**	C	T	0.68	0.60
22	44,340,922	**rs2294916**	T	G	0.68	0.59
22	44,341,141	rs117089907	C	T	0.02	N.D.
22	44,341,193	**rs4823179**	T	C	0.68	0.60
22	44,341,298	**rs4823180**	G	A	0.68	0.60
22	44,341,606	**rs4823181**	T	C	0.68	0.60
22	44,341,666	**rs13055900**	A	G	0.68	0.60
22	44,341,672	**rs13055874**	T	C	0.68	0.59
22	44,341,986	**rs2294917**	T	C	0.32	0.29
22	44,342,116	rs2294918	A	G	1.00	N.D.
22	44,342,325	**rs2294919**	C	T	0.32	0.27
22	44,342,969	**rs2008451**	T	C	0.68	0.60
22	44,343,151	**rs1810508**	A	G	0.68	0.60
22	44,343,626	**rs12484795**	A	C	0.68	0.59
22	44,345,771	**rs13054885**	G	A	0.68	0.54
22	44,345,926	rs28550680	C	T	0.32	N.S.
22	44,345,952	rs142354757	AAAAAAAT	A	0.32	N.S.
22	44,346,079	rs11705659	A	G	1.00	N.D.
22	44,346,128	rs11704562	C	T	0.32	N.S.
22	44,346,639	**rs7289329**	T	G	0.32	0.26
22	44,346,925	ss831884189	G	A	0.05	N.D.

22	44,346,965	**rs5764043**	G	A	0.32	0.26
22	44,347,137	**rs5764044**	C	G	0.32	0.26
22	44,347,250	**rs5764045**	C	T	0.32	0.25
22	44,347,251	**rs2092501**	G	A	0.68	0.55
22	44,347,355	rs2092502	G	C	1.00	N.D.
22	44,347,433	**rs9614293**	G	T	0.32	0.26
22	44,347,695	**rs149404964**	A	G	0.09	0.02
22	44,348,116	**rs11912828**	G	A	0.32	0.27
22	44,348,446	**rs34912062**	G	T	0.68	0.54
22	44,348,695	ss831884190	T	A	0.05	N.D.
22	44,348,803	rs5764421	T	A	1.00	N.D.
22	44,349,215	rs1474744	T	C	1.00	N.D.
22	44,349,236	**rs1474745**	T	C	0.68	0.54
22	44,349,309	**rs146333519**	T	C	0.11	0.04
22	44,349,908	rs184956348	G	T	0.02	N.D.
22	44,350,417	rs1474746	C	G	1.00	N.D.
22	44,354,111	**rs738491**	C	T	0.68	0.62
22	44,354,398	rs1807589	A	G	1.00	N.D.
22	44,354,865	**rs11705218**	A	G	0.32	0.27
22	44,354,882	rs5764425	G	T	1.00	N.D.
22	44,355,230	rs6006591	A	G	1.00	N.D.
22	44,355,569	rs2401513	C	T	0.32	N.S.
22	44,356,349	**rs2064361**	C	G	0.32	0.27
22	44,356,468	**rs56373884**	G	A	0.68	0.54
22	44,356,566	**rs9614294**	G	A	0.32	0.27
22	44,357,174	rs201208438	CT	C	0.02	N.D.
22	44,357,894	**rs56219234**	G	T	0.68	0.62
22	44,357,900	rs2896021	G	A	1.00	N.D.
22	44,358,812	**rs5764047**	G	A	0.32	0.26
22	44,358,997	**rs16991236**	A	G	0.63	0.46
22	44,360,007	**rs2073082**	G	A	0.32	0.26
22	44,360,010	**rs2073083**	C	A	0.32	0.26
22	44,361,497	**rs5764430**	C	A	0.32	0.26
22	44,361,713	**rs12165526**	T	A	0.16	0.08
22	44,361,842	**rs2294921**	C	T	0.68	0.54
22	44,361,941	ss831884191	G	T	0.04	N.D.

22	44,362,532	rs5764431	G	A	1.00	N.D.
22	44,362,623	**rs144144339**	G	A	0.07	0.04
22	44,362,815	**rs9614300**	C	T	0.32	0.26
22	44,363,619	rs79227988	T	TC	1.00	N.D.
22	44,363,939	**rs3788603**	T	A	0.32	0.27
22	44,364,256	rs201102948	G	A	0.02	N.D.
22	44,364,594	rs5764434	C	T	1.00	N.D.
22	44,364,794	rs2273031	T	C	1.00	N.D.
22	44,365,232	rs6006594	G	C	1.00	N.D.
22	44,365,742	rs6006465	G	A	1.00	N.D.
22	44,366,809	rs2235771	A	G	1.00	N.D.
22	44,367,597	rs67877195	G	GT	0.13	N.D.
22	44,368,122	**rs3761472**	A	G	0.68	0.54
22	44,368,204	rs3177036	A	G	1.00	N.D.
22	44,368,741	**rs932430**	C	T	0.32	0.89
22	44,369,291	**rs117177740**	G	A	0.09	0.03
22	44,369,329	**rs2235772**	C	T	0.68	0.62
22	44,369,429	rs6006466	C	T	1.00	N.D.
22	44,370,175	**rs2235773**	C	T	0.32	0.26
22	44,370,336	rs738492	T	G	1.00	N.D.
22	44,370,337	rs77225204	T	C	1.00	N.D.
22	44,370,615	rs738495	T	C	1.00	N.D.
22	44,371,243	rs4823106	A	G	1.00	N.D.
22	44,371,312	rs2281294	G	A	1.00	N.D.
22	44,371,406	**rs61473277**	A	G	0.68	0.54
22	44,371,725	rs5764442	C	G	1.00	N.D.
22	44,372,069	**rs2073084**	G	A	0.68	0.62
22	44,372,190	**rs2073085**	C	T	0.68	0.62
22	44,372,331	**rs2073086**	C	T	0.68	0.62
22	44,372,632	**rs14315**	C	T	0.68	0.62
22	44,373,579	**rs2073088**	G	A	0.32	0.27
22	44,374,195	rs2281295	G	T	0.32	N.S.
22	44,374,267	rs5764048	A	G	1.00	N.D.
22	44,374,584	rs34233580	A	T	1.00	N.D.
22	44,375,244	rs6519823	C	T	1.00	N.D.
22	44,375,247	rs2235774	A	C	1.00	N.D.

22	44,375,275	**rs2235775**	C	A	0.68	0.62
22	44,375,507	rs8142910	T	C	1.00	N.D.
22	44,375,742	**rs11090620**	C	T	0.68	0.62
22	44,376,335	**rs67450864**	C	T	0.68	0.62
22	44,377,035	rs146481554	G	A	0.02	N.D.
22	44,377,442	rs4823182	A	G	0.68	N.S.
22	44,377,999	**rs2235776**	C	T	0.68	0.54
22	44,378,368	rs117721198	C	T	0.05	N.D.
22	44,378,672	**rs4823183**	C	A	0.68	0.54
22	44,378,809	**rs2235777**	C	T	0.68	0.54
22	44,379,565	**rs2294922**	G	C	0.68	0.54
22	44,379,740	**rs2294923**	C	A	0.68	0.54
22	44,379,822	rs10452	T	C	1.00	N.D.
22	44,379,838	rs8418	A	G	1.00	N.D.
22	44,380,009	**rs9626079**	A	G	0.68	0.54
22	44,380,170	**rs71313378**	G	GCTTC	0.68	0.54
22	44,380,767	**rs12167845**	T	C	0.68	0.54
22	44,381,223	rs4823107	G	C	1.00	N.D.
22	44,381,340	**rs4823108**	T	C	0.68	0.54
22	44,381,482	rs4823109	C	T	0.68	N.S.
22	44,381,545	rs736082	C	T	1.00	N.D.
22	44,381,944	**rs140963094**	ATGGAGTCTTGCTC	A	0.66	0.62
22	44,382,004	**rs6006599**	C	A	0.68	0.62
22	44,382,533	**rs2294926**	C	T	0.68	0.62
22	44,382,684	**rs2294927**	T	C	0.68	0.62
22	44,383,400	**rs6006602**	C	T	0.68	0.62
22	44,383,432	**rs6006468**	G	C	0.68	0.62
22	44,383,617	**rs6006469**	C	G	0.68	0.62
22	44,383,673	rs142690680	A	T	0.05	N.D.
22	44,385,594	rs2073079	A	G	0.68	N.S.
22	44,386,281	**rs7587**	C	T	0.32	0.25
22	44,387,108	**rs1986095**	A	G	0.68	0.62
22	44,387,932	**rs10656207**	C	CTA	0.68	0.62
22	44,387,996	rs6006470	G	C	1.00	N.D.
22	44,388,208	rs6006471	C	T	1.00	N.D.
22	44,388,337	**rs5764451**	G	A	0.32	0.25

22	44,388,417	**rs3788604**	A	G	0.68	0.62
22	44,388,817	**rs3827385**	T	C	0.68	0.54
22	44,389,514	**rs2235778**	T	C	0.68	0.62
22	44,390,236	rs5764053	T	C	1.00	N.D.
22	44,390,366	rs2235779	A	G	1.00	N.D.
22	44,390,547	**rs2281296**	G	A	0.32	0.25
22	44,390,568	**rs2281297**	C	T	0.68	0.62
22	44,391,025	rs5764055	T	C	1.00	N.D.
22	44,391,234	**rs2281298**	G	A	0.68	0.54
22	44,391,588	**rs2179642**	T	C	0.68	0.62
22	44,391,686	**rs2143571**	G	A	0.68	0.54
22	44,393,075	**rs6006473**	C	T	0.68	0.62
22	44,393,241	**rs6006474**	C	T	0.68	0.62
22	44,394,019	**rs2401514**	T	A	0.68	0.54
22	44,394,402	**rs2073080**	C	T	0.68	0.54
22	44,395,389	**rs2281292**	A	C	0.68	0.62
22	44,395,451	**rs1007863**	T	C	0.68	0.62
22	44,396,144	rs190109984	G	A	0.02	N.D.
22	44,396,533	rs75848795	G	A	0.05	N.D.
22	44,397,887	rs3083324	GTTTCCCTCC	G	1.00	N.D.
22	44,398,201	rs738496	G	C	1.00	N.D.
22	44,398,524	**rs5764455**	A	G	0.32	0.49
22	44,398,797	**rs117469470**	C	G	0.09	0.08
22	44,399,761	**rs6006610**	A	G	0.32	0.39
22	44,400,698	**rs6006611**	G	A	0.32	0.35
22	44,401,022	**rs4823184**	C	T	0.52	0.44
22	44,401,124	**rs9626087**	C	T	0.68	0.48
22	44,401,191	**rs8137707**	C	T	0.14	0.13
22	44,401,232	**rs8141269**	G	A	0.80	0.84
22	44,401,282	**rs117448761**	C	T	0.09	0.02
22	44,401,820	rs8138668	C	T	0.02	N.D.
22	44,402,167	**rs76409096**	T	TA	0.63	0.54
22	44,404,484	**rs16991328**	A	G	0.16	0.15
22	44,404,522	**rs9614308**	A	G	0.77	0.85
22	44,405,213	rs117094531	G	C	0.02	N.D.
22	44,405,614	rs9614309	A	C	0.20	N.S.

22	44,408,241	**rs4823185**	T	C	0.80	0.74
22	44,408,627	**rs34505405**	CT	C	0.80	0.74
22	44,408,935	rs35222770	C	G	0.80	N.S.
22	44,409,176	**rs16991341**	G	A	0.63	0.50
22	44,409,575	**rs6006618**	C	T	0.63	0.52
22	44,409,993	**rs12484530**	G	A	0.52	0.34
22	44,410,126	rs149620106	T	G	0.02	N.D.
22	44,410,131	rs9625971	T	C	0.02	N.D.
22	44,410,173	rs5764058	A	G	0.91	N.S.
22	44,411,486	rs140454231	G	A	0.02	N.D.
22	44,411,910	**rs9614313**	C	T	0.79	0.74
22	44,412,178	**rs140178505**	G	A	0.07	0.02
22	44,412,182	**rs2401515**	T	C	0.48	0.47
22	44,412,190	**rs7289219**	A	T	0.23	0.28
22	44,412,192	**rs2401516**	G	A	0.54	0.47
22	44,412,209	**rs2401517**	T	C	0.80	0.77
22	44,412,227	**rs2401518**	C	T	0.79	0.76
22	44,412,228	**rs2401519**	A	G	0.80	0.77
22	44,412,256	rs9614314	A	G	0.04	N.D.
22	44,412,635	rs114704228	T	C	0.09	N.S.
22	44,412,706	rs151015821	A	C	0.02	N.D.
22	44,412,952	rs12167483	G	A	0.05	N.D.
22	44,413,270	rs78788310	A	G	0.05	N.D.
22	44,414,326	**rs9626091**	G	A	0.54	0.53
22	44,414,782	rs10714888	GT	G	0.27	N.S.
22	44,415,325	**rs9614315**	G	C	0.27	0.18
22	44,415,523	rs5764466	A	G	1.00	N.D.
22	44,416,110	rs147596539	A	C	0.04	N.D.
22	44,416,361	**rs6006477**	A	C	0.41	0.28
22	44,416,429	**rs8142117**	A	G	0.38	0.26
22	44,417,639	rs62226384	T	A	0.05	N.D.
22	44,417,927	**rs74427758**	A	G	0.11	0.16
22	44,417,970	**rs135114**	C	T	0.20	0.14
22	44,418,039	rs7289308	G	A	0.05	N.D.
22	44,418,139	rs139746146	C	T	0.05	N.D.
22	44,418,321	rs130415	C	T	0.34	N.D.

22	44,418,400	rs117826218	C	T	0.07	N.D.
22	44,418,444	rs5764467	A	G	0.36	N.D.
22	44,418,447	rs5764468	T	C	0.14	N.D.
22	44,418,502	rs77879449	A	T	0.02	N.D.
22	44,418,627	rs56956306	AT	A	0.09	N.D.
22	44,419,010	rs5764060	G	C	0.64	N.D.
22	44,419,039	rs113509766	C	T	0.25	N.D.
22	44,419,185	rs147560545	G	T	0.09	N.D.
22	44,419,407	rs6006621	T	C	0.18	N.D.
22	44,419,871	rs7285340	T	C	0.55	N.D.
22	44,420,015	rs35928604	G	C	0.39	N.D.
22	44,420,049	rs7290527	G	C	1.00	N.D.
22	44,420,118	rs111806469	C	G	1.00	N.D.
22	44,420,156	rs112388263	T	A	1.00	N.D.
22	44,420,498	rs112385337	A	G	0.55	N.D.
22	44,420,502	rs111826791	A	C	0.09	N.D.
22	44,420,859	rs9941915	A	T	0.04	N.D.
22	44,420,897	rs74548230	C	T	0.09	N.D.
22	44,421,425	rs2267591	G	A	0.09	N.D.
22	44,421,563	rs2267592	G	T	0.66	N.D.
22	44,421,603	rs139003197	T	TTCTC	0.21	N.D.
22	44,422,058	rs146844123	C	T	0.02	N.D.
22	44,422,076	rs117577313	A	G	0.07	N.D.
22	44,422,333	rs12170546	T	C	0.20	N.D.
22	44,422,501	rs80029111	C	T	0.11	N.D.
22	44,422,567	rs78095343	G	C	0.04	N.D.
22	44,422,638	rs11914048	T	C	0.09	N.D.
22	44,422,729	rs135115	A	G	1.00	N.D.
22	44,422,912	rs9306472	T	C	0.20	N.D.
22	44,422,945	rs76180808	C	T	0.18	N.D.
22	44,422,986	rs130416	C	G	1.00	N.D.
22	44,423,098	rs73888819	T	C	0.04	N.D.
22	44,423,396	rs7288265	G	A	0.57	N.D.
22	44,423,890	rs138117859	C	T	0.02	N.D.
22	44,423,923	rs74279267	C	G	0.11	N.D.
22	44,424,108	rs6006622	C	T	0.66	N.D.

22	44,424,191	rs13057162	T	G	0.11	N.D.
22	44,424,192	rs79270758	G	T	0.55	N.D.
22	44,424,423	rs5764472	A	G	0.55	N.D.
22	44,424,649	rs5764473	T	C	0.20	N.D.
22	44,424,829	rs79967345	A	G	0.04	N.D.
22	44,425,427	rs7292997	A	G	0.66	N.D.
22	44,425,647	rs184382968	G	A	0.02	N.D.
22	44,425,678	rs149903880	T	G	0.11	N.D.
22	44,425,761	rs79578076	G	C	0.04	N.D.

SNPs in bold were successfully genotyped. Chr; chromosome, N.D.; Invader probe was not designed; N.S., genotyping was not successful.

Supplementary Table 4 Associations of variations with NAFLD and NASH

SNP	Tested allele	Tested allele frequency				NAFLD vs. control		NASH vs. control		NASH vs. simple steatosis	
		Control (n=1012)	NAFLD (n=540)	NASH (n=488)	simple steatosis (n=52)	*P*	OR (95%CI)	*P*	OR (95%CI)	*P*	OR (95%CI)
rs5845621	C	0.37	0.39	0.39	0.38	0.53	1.07 (0.87 - 1.31)	0.46	1.09 (0.87 - 1.35)	0.63	1.12 (0.72 - 1.73)
rs2076212	T	0.10	0.10	0.10	0.12	0.43	1.14 (0.82 - 1.58)	0.71	1.07 (0.76 - 1.50)	0.83	0.93 (0.48 - 1.81)
rs139047	A	0.43	0.44	0.44	0.40	0.053	1.23 (1.00 - 1.51)	0.041	1.26 (1.01 - 1.56)	0.43	1.19 (0.77 - 1.83)
rs9625961	A	0.82	0.84	0.84	0.85	0.14	1.23 (0.94 - 1.61)	0.11	1.27 (0.95 - 1.68)	0.92	1.03 (0.57 - 1.85)
LD block 1											
rs738407	C	0.61	0.71	0.72	0.60	**1.3×10^{-7}**	1.81 (1.45 - 2.26)	**2.7×10^{-8}**	1.95 (1.54 - 2.47)	0.0016	1.99 (1.30 - 3.06)
rs734561	T	0.34	0.40	0.41	0.29	0.013	1.30 (1.06 - 1.59)	0.0019	1.40 (1.13 - 1.74)	0.0060	1.92 (1.21 - 3.06)
rs2006943	A	0.46	0.56	0.58	0.39	**4.6×10^{-6}**	1.61 (1.31 - 1.97)	**1.2×10^{-7}**	1.79 (1.44 - 2.23)	**5.6×10^{-5}**	2.54 (1.62 – 4.00)
LD block 2											
rs139051	A	0.70	0.78	0.79	0.70	**3.3×10^{-5}**	1.64 (1.30 - 2.08)	**2.9×10^{-6}**	1.83 (1.42 - 2.35)	0.052	1.58 (1.00 - 2.50)
rs738409	G	0.45	0.60	0.62	0.46	**1.1×10^{-12}**	2.13 (1.73 - 2.62)	**1.1×10^{-13}**	2.32 (1.86 - 2.90)	6.7×10^{-4}	2.05 (1.36 - 3.10)
rs738408	T	0.45	0.60	0.62	0.46	**1.1×10^{-12}**	2.13 (1.73 - 2.62)	**1.1×10^{-13}**	2.33 (1.86 - 2.91)	6.7×10^{-4}	2.05 (1.36 - 3.10)
rs3747207	A	0.45	0.60	0.62	0.46	**7.4×10^{-13}**	2.14 (1.74 - 2.63)	**8.4×10^{-14}**	2.33 (1.87 - 2.91)	7.1×10^{-4}	2.04 (1.35 - 3.09)
rs12483959	A	0.45	0.60	0.61	0.46	**7.4×10^{-12}**	2.06 (1.68 - 2.54)	**1.1×10^{-12}**	2.23 (1.79 - 2.79)	0.0012	1.97 (1.31 - 2.98)
rs9625962	C	0.45	0.60	0.61	0.46	**9.8×10^{-12}**	2.05 (1.67 - 2.53)	**1.4×10^{-12}**	2.23 (1.78 - 2.78)	0.0012	1.97 (1.31 - 2.98)
rs11090617	T	0.45	0.59	0.61	0.46	**1.0×10^{-11}**	2.05 (1.67 - 2.52)	**1.5×10^{-12}**	2.22 (1.78 - 2.78)	0.0013	1.97 (1.30 - 2.97)
rs139052	A	0.61	0.73	0.74	0.64	**3.4×10^{-10}**	2.05 (1.64 - 2.56)	**6.1×10^{-10}**	2.11 (1.67 - 2.68)	0.0088	1.78 (1.16 - 2.74)
rs16991158	A	0.45	0.60	0.61	0.46	**9.8×10^{-12}**	2.05 (1.67 - 2.53)	**1.4×10^{-12}**	2.23 (1.78 - 2.78)	0.0012	1.97 (1.31 - 2.98)
rs36055245	G	0.45	0.60	0.61	0.46	**7.1×10^{-12}**	2.06 (1.68 - 2.54)	**9.3×10^{-13}**	2.24 (1.80 - 2.80)	0.0011	1.99 (1.32 – 3.00)
rs12484700	G	0.45	0.60	0.61	0.47	**2.3×10^{-11}**	2.02 (1.64 - 2.48)	**4.8×10^{-12}**	2.17 (1.74 - 2.70)	0.0021	1.90 (1.26 - 2.86)
rs1883350	C	0.50	0.63	0.65	0.50	**2.0×10^{-11}**	2.05 (1.66 - 2.53)	**2.7×10^{-12}**	2.23 (1.78 - 2.79)	7.4×10^{-4}	2.03 (1.35 - 3.07)
rs4823173	A	0.45	0.59	0.60	0.45	**5.9×10^{-11}**	1.99 (1.62 - 2.45)	**8.1×10^{-12}**	2.15 (1.73 - 2.68)	0.0010	2.01 (1.33 - 3.05)
rs2076211	T	0.45	0.59	0.60	0.46	**3.8×10^{-11}**	2.00 (1.63 - 2.46)	**6.9×10^{-12}**	2.16 (1.73 - 2.69)	0.0017	1.93 (1.28 - 2.91)
rs2294433	A	0.45	0.59	0.60	0.45	**5.8×10^{-11}**	1.99 (1.62 - 2.45)	**8.0×10^{-12}**	2.15 (1.73 - 2.68)	0.0010	2.01 (1.33 - 3.05)

rs1977080	T	0.45	0.59	0.61	0.46	**2.9×10^{-11}**	2.01 (1.64 - 2.47)	**5.3×10^{-12}**	2.16 (1.74 - 2.69)	0.0016	1.94 (1.29 - 2.92)
rs1977081	C	0.45	0.59	0.61	0.45	**1.1×10^{-10}**	1.96 (1.60 - 2.41)	**1.5×10^{-11}**	2.12 (1.70 - 2.63)	8.6×10^{-4}	2.02 (1.34 - 3.06)
rs12484466	G	0.45	0.60	0.61	0.47	**3.9×10^{-11}**	1.99 (1.62 - 2.44)	**7.6×10^{-12}**	2.14 (1.72 - 2.67)	0.0024	1.88 (1.25 - 2.82)
rs2076208	C	0.66	0.77	0.77	0.68	**9.3×10^{-9}**	1.94 (1.55 - 2.43)	**1.5×10^{-8}**	2.01 (1.58 - 2.56)	0.010	1.79 (1.15 - 2.78)
rs1997693	G	0.45	0.59	0.60	0.45	**4.2×10^{-11}**	2.00 (1.63 - 2.45)	**4.8×10^{-12}**	2.17 (1.74 - 2.69)	0.0011	2.00 (1.32 - 3.04)
rs13056638	G	0.44	0.59	0.60	0.46	**9.6×10^{-12}**	2.04 (1.66 - 2.50)	**2.1×10^{-12}**	2.19 (1.76 - 2.72)	0.0020	1.92 (1.27 - 2.89)
rs1883348	G	0.45	0.59	0.61	0.45	**2.9×10^{-11}**	2.01 (1.64 - 2.47)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	8.7×10^{-4}	2.02 (1.34 - 3.06)
rs1883349	A	0.45	0.59	0.60	0.46	**2.9×10^{-11}**	2.01 (1.63 - 2.46)	**5.4×10^{-12}**	2.16 (1.73 - 2.69)	0.0015	1.94 (1.29 - 2.92)
rs2281138	C	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.48)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)
rs2281137	C	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.47)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)
rs2281135	A	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.48)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)
rs2072907	G	0.45	0.59	0.61	0.46	**3.9×10^{-11}**	2.00 (1.63 - 2.46)	**7.1×10^{-12}**	2.16 (1.73 - 2.68)	0.0017	1.93 (1.28 - 2.91)
rs34879941	T	0.45	0.59	0.61	0.46	**4.3×10^{-11}**	1.99 (1.62 - 2.44)	**7.3×10^{-12}**	2.15 (1.72 - 2.67)	0.0015	1.95 (1.29 - 2.93)
rs71218095	TC	0.45	0.59	0.61	0.46	**2.3×10^{-11}**	2.02 (1.64 - 2.47)	**3.9×10^{-12}**	2.17 (1.75 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs2072906	G	0.45	0.59	0.61	0.46	**2.1×10^{-11}**	2.02 (1.64 - 2.48)	**3.6×10^{-12}**	2.18 (1.75 - 2.71)	0.0016	1.94 (1.29 - 2.94)
rs2076207	G	0.44	0.59	0.60	0.46	**2.2×10^{-11}**	2.01 (1.64 - 2.47)	**3.9×10^{-12}**	2.17 (1.74 - 2.70)	0.0015	1.94 (1.29 - 2.93)
rs2072905	G	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.47)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)
rs2896019	G	0.45	0.60	0.61	0.47	**6.6×10^{-12}**	2.06 (1.68 - 2.53)	**9.6×10^{-13}**	2.24 (1.79 - 2.79)	0.0018	1.92 (1.28 - 2.89)
rs2401512	G	0.45	0.59	0.61	0.46	**2.7×10^{-11}**	2.01 (1.64 - 2.47)	**4.5×10^{-12}**	2.17 (1.74 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs2896020	C	0.45	0.59	0.61	0.45	**4.5×10^{-11}**	2.00 (1.62 - 2.45)	**6.1×10^{-12}**	2.16 (1.73 - 2.69)	8.9×10^{-4}	2.02 (1.33 - 3.06)
rs4823176	C	0.45	0.59	0.61	0.46	**2.3×10^{-11}**	2.01 (1.64 - 2.47)	**3.9×10^{-12}**	2.17 (1.75 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs2281293	C	0.45	0.59	0.61	0.45	**4.1×10^{-11}**	2.00 (1.63 - 2.46)	**5.6×10^{-12}**	2.16 (1.74 - 2.69)	8.6×10^{-4}	2.03 (1.34 - 3.07)
rs16991175	C	0.45	0.59	0.61	0.46	**1.3×10^{-11}**	2.04 (1.66 - 2.50)	**2.2×10^{-12}**	2.20 (1.76 - 2.74)	0.0014	1.95 (1.30 - 2.94)
rs35621602	A	0.45	0.59	0.61	0.45	**1.4×10^{-11}**	2.04 (1.66 - 2.50)	**1.6×10^{-12}**	2.21 (1.77 - 2.76)	6.9×10^{-4}	2.06 (1.36 - 3.12)
rs34352134	T	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.47)	**3.8×10^{-12}**	2.17 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)
rs34376930	T	0.45	0.59	0.61	0.46	**2.2×10^{-11}**	2.02 (1.64 - 2.47)	**3.8×10^{-12}**	2.17 (1.75 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs2073081	C	0.45	0.59	0.60	0.46	**2.5×10^{-11}**	2.01 (1.64 - 2.47)	**4.3×10^{-12}**	2.17 (1.74 - 2.70)	0.0016	1.94 (1.29 - 2.92)
rs1010023	C	0.45	0.59	0.61	0.46	**1.6×10^{-11}**	2.03 (1.65 - 2.49)	**2.6×10^{-12}**	2.19 (1.76 - 2.73)	0.0013	1.96 (1.30 - 2.96)
rs1010022	G	0.45	0.59	0.61	0.46	**2.0×10^{-11}**	2.02 (1.65 - 2.48)	**3.5×10^{-12}**	2.18 (1.75 - 2.71)	0.0015	1.95 (1.29 - 2.93)

rs8142145	C	0.45	0.59	0.61	0.46	**2.5×10^{-11}**	2.01 (1.64 - 2.47)	**4.3×10^{-12}**	2.17 (1.74 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs73176497	A	0.45	0.59	0.61	0.46	**2.7×10^{-11}**	2.01 (1.64 - 2.47)	**4.6×10^{-12}**	2.17 (1.74 - 2.70)	0.0015	1.95 (1.29 - 2.93)
rs5764416	T	0.57	0.69	0.70	0.61	**9.1×10^{-10}**	1.95 (1.58 - 2.42)	**1.6×10^{-9}**	2.01 (1.60 - 2.52)	0.016	1.68 (1.10 - 2.55)
rs78023701	T	0.56	0.69	0.70	0.60	**5.3×10^{-10}**	1.98 (1.59 - 2.45)	**9.2×10^{-10}**	2.04 (1.62 - 2.56)	0.011	1.74 (1.14 - 2.65)
rs926633	A	0.45	0.59	0.61	0.46	**4.7×10^{-11}**	1.99 (1.62 - 2.44)	**6.6×10^{-12}**	2.16 (1.73 - 2.69)	0.0014	1.94 (1.29 - 2.92)
rs3810622	T	0.57	0.70	0.70	0.62	**5.7×10^{-10}**	1.97 (1.59 - 2.44)	**1.2×10^{-9}**	2.03 (1.61 - 2.55)	0.025	1.62 (1.06 - 2.46)
rs13056555	G	0.45	0.59	0.60	0.47	**7.9×10^{-11}**	1.98 (1.61 - 2.43)	**1.7×10^{-11}**	2.13 (1.71 - 2.65)	0.0033	1.85 (1.23 - 2.78)
rs2294915	T	0.45	0.60	0.61	0.47	**2.5×10^{-11}**	2.01 (1.64 - 2.47)	**4.7×10^{-12}**	2.17 (1.74 - 2.70)	0.0025	1.88 (1.25 - 2.82)
rs2294916	G	0.45	0.59	0.61	0.47	**2.7×10^{-11}**	2.01 (1.64 - 2.47)	**5.1×10^{-12}**	2.17 (1.74 - 2.70)	0.0025	1.88 (1.25 - 2.82)
rs4823179	C	0.45	0.60	0.61	0.48	**2.1×10^{-11}**	2.02 (1.64 - 2.48)	**4.7×10^{-12}**	2.17 (1.74 - 2.70)	0.0043	1.82 (1.21 - 2.74)
rs4823180	A	0.45	0.60	0.61	0.47	**2.5×10^{-11}**	2.01 (1.64 - 2.47)	**4.7×10^{-12}**	2.17 (1.74 - 2.70)	0.0025	1.88 (1.25 - 2.82)
rs4823181	C	0.45	0.60	0.61	0.47	**2.6×10^{-11}**	2.01 (1.64 - 2.47)	**4.9×10^{-12}**	2.17 (1.74 - 2.70)	0.0025	1.88 (1.25 - 2.82)
rs13055900	G	0.45	0.60	0.61	0.47	**2.5×10^{-11}**	2.01 (1.64 - 2.47)	**4.8×10^{-12}**	2.17 (1.74 - 2.70)	0.0025	1.88 (1.25 - 2.82)
rs13055874	C	0.45	0.59	0.61	0.46	**3.4×10^{-11}**	2.00 (1.63 - 2.46)	**5.6×10^{-12}**	2.16 (1.74 - 2.69)	0.0015	1.94 (1.29 - 2.91)
rs2294917	T	0.59	0.71	0.72	0.63	**2.0×10^{-8}**	1.84 (1.49 - 2.28)	**3.5×10^{-8}**	1.90 (1.51 - 2.38)	0.015	1.69 (1.11 - 2.57)
rs2294919	C	0.62	0.73	0.74	0.65	**9.9×10^{-10}**	2.01 (1.61 - 2.52)	**2.1×10^{-9}**	2.07 (1.63 - 2.62)	0.014	1.73 (1.12 - 2.67)
rs2008451	C	0.45	0.60	0.61	0.47	**2.4×10^{-11}**	2.02 (1.64 - 2.48)	**4.0×10^{-12}**	2.18 (1.75 - 2.72)	0.0023	1.89 (1.26 - 2.84)
rs1810508	G	0.45	0.60	0.61	0.47	**2.1×10^{-11}**	2.02 (1.65 - 2.49)	**3.6×10^{-12}**	2.18 (1.75 - 2.72)	0.0023	1.88 (1.25 - 2.83)
rs12484795	C	0.44	0.59	0.60	0.45	**6.8×10^{-11}**	1.98 (1.61 - 2.42)	**6.1×10^{-12}**	2.15 (1.73 - 2.68)	0.0011	1.98 (1.31 - 2.97)
rs13054885	A	0.42	0.54	0.55	0.40	**2.0×10^{-7}**	1.71 (1.40 - 2.09)	**2.7×10^{-8}**	1.84 (1.48 - 2.27)	0.0018	1.97 (1.29 - 3.02)
LD block 3											
rs7289329	T	0.64	0.74	0.75	0.68	**1.1×10^{-6}**	1.72 (1.38 - 2.14)	**2.1×10^{-6}**	1.75 (1.39 - 2.20)	0.070	1.51 (0.97 - 2.37)
rs5764043	G	0.64	0.74	0.75	0.68	**1.0×10^{-6}**	1.72 (1.39 - 2.14)	**2.0×10^{-6}**	1.75 (1.39 - 2.20)	0.070	1.51 (0.97 - 2.37)
rs5764044	C	0.64	0.74	0.75	0.68	**1.1×10^{-6}**	1.72 (1.38 - 2.14)	**2.1×10^{-6}**	1.75 (1.39 - 2.20)	0.069	1.52 (0.97 - 2.38)
rs5764045	C	0.65	0.75	0.75	0.70	**7.6×10^{-7}**	1.74 (1.40 - 2.16)	**2.5×10^{-6}**	1.74 (1.38 - 2.19)	0.14	1.41 (0.90 - 2.22)
rs2092501	A	0.43	0.55	0.56	0.46	**1.8×10^{-8}**	1.80 (1.47 - 2.21)	**7.7×10^{-9}**	1.90 (1.53 - 2.36)	0.027	1.60 (1.06 - 2.42)
rs9614293	G	0.64	0.74	0.75	0.68	**7.7×10^{-7}**	1.74 (1.40 - 2.16)	**1.4×10^{-6}**	1.77 (1.40 - 2.23)	0.064	1.53 (0.98 - 2.40)
rs11912828	G	0.62	0.73	0.73	0.67	**4.9×10^{-8}**	1.84 (1.48 - 2.29)	**1.2×10^{-7}**	1.86 (1.48 - 2.35)	0.11	1.45 (0.92 - 2.27)
rs34912062	T	0.42	0.54	0.55	0.43	**6.6×10^{-9}**	1.83 (1.49 - 2.25)	**2.4×10^{-9}**	1.93 (1.56 - 2.40)	0.0074	1.78 (1.17 - 2.72)

rs1474745	C	0.41	0.54	0.55	0.43	**1.3×10^{-8}**	1.81 (1.48 - 2.22)	**2.5×10^{-9}**	1.93 (1.56 - 2.40)	0.0094	1.75 (1.15 - 2.66)
rs738491	T	0.49	0.62	0.63	0.51	**1.5×10^{-8}**	1.81 (1.47 - 2.22)	**4.2×10^{-9}**	1.92 (1.55 - 2.39)	0.0050	1.82 (1.20 - 2.78)
rs11705218	A	0.63	0.73	0.74	0.67	**5.6×10^{-7}**	1.74 (1.40 - 2.17)	**9.9×10^{-7}**	1.78 (1.41 - 2.23)	0.056	1.55 (0.99 - 2.44)
rs2064361	C	0.63	0.73	0.74	0.67	**5.4×10^{-7}**	1.75 (1.40 - 2.17)	**9.6×10^{-7}**	1.78 (1.41 - 2.24)	0.056	1.55 (0.99 - 2.44)
rs56373884	A	0.42	0.54	0.55	0.43	**7.2×10^{-9}**	1.84 (1.50 - 2.26)	**2.2×10^{-9}**	1.94 (1.56 - 2.42)	0.0089	1.76 (1.15 - 2.69)
rs9614294	G	0.64	0.73	0.74	0.67	**6.4×10^{-7}**	1.74 (1.40 - 2.16)	**1.1×10^{-6}**	1.77 (1.41 - 2.23)	0.056	1.55 (0.99 - 2.44)
rs56219234	T	0.50	0.62	0.63	0.51	**9.9×10^{-9}**	1.82 (1.48 - 2.24)	**2.5×10^{-9}**	1.95 (1.56 - 2.42)	0.0046	1.83 (1.20 - 2.79)
rs5764047	G	0.64	0.74	0.74	0.67	**4.7×10^{-7}**	1.75 (1.41 - 2.18)	**8.1×10^{-7}**	1.78 (1.42 - 2.25)	0.053	1.56 (0.99 - 2.45)
rs16991236	G	0.36	0.46	0.48	0.34	**2.9×10^{-6}**	1.65 (1.34 - 2.03)	**2.3×10^{-7}**	1.79 (1.44 - 2.23)	0.0026	1.99 (1.27 - 3.10)
rs2073082	G	0.63	0.74	0.74	0.67	**3.4×10^{-7}**	1.77 (1.42 - 2.20)	**5.8×10^{-7}**	1.80 (1.43 - 2.27)	0.052	1.56 (1.00 - 2.45)
rs2073083	C	0.64	0.74	0.74	0.67	**4.8×10^{-7}**	1.75 (1.41 - 2.18)	**8.2×10^{-7}**	1.78 (1.42 - 2.25)	0.053	1.56 (0.99 - 2.45)
rs5764430	C	0.64	0.74	0.74	0.68	**4.8×10^{-7}**	1.75 (1.41 - 2.18)	**8.7×10^{-7}**	1.78 (1.42 - 2.24)	0.065	1.53 (0.97 - 2.41)
rs2294921	T	0.42	0.54	0.55	0.44	**7.1×10^{-9}**	1.83 (1.49 - 2.25)	**3.1×10^{-9}**	1.93 (1.55 - 2.40)	0.016	1.67 (1.10 - 2.53)
rs9614300	C	0.64	0.74	0.74	0.67	**4.5×10^{-7}**	1.75 (1.41 - 2.18)	**7.8×10^{-7}**	1.79 (1.42 - 2.25)	0.053	1.56 (0.99 - 2.45)
rs3788603	T	0.63	0.73	0.74	0.67	**7.3×10^{-7}**	1.73 (1.39 - 2.15)	**1.3×10^{-6}**	1.76 (1.4 - 2.21)	0.062	1.53 (0.98 - 2.40)
rs3761472	G	0.42	0.54	0.55	0.45	**7.2×10^{-9}**	1.84 (1.50 - 2.26)	**2.8×10^{-9}**	1.94 (1.56 - 2.41)	0.021	1.64 (1.08 - 2.49)
rs932430	T	0.86	0.89	0.89	0.85	0.19	1.24 (0.90 - 1.69)	0.068	1.37 (0.98 - 1.92)	0.13	1.58 (0.87 - 2.87)
rs2235772	T	0.50	0.62	0.63	0.52	**3.3×10^{-8}**	1.78 (1.45 - 2.18)	**9.9×10^{-9}**	1.89 (1.52 - 2.35)	0.013	1.70 (1.12 - 2.58)
rs2235773	C	0.64	0.74	0.74	0.67	**4.7×10^{-7}**	1.75 (1.41 - 2.18)	**8.1×10^{-7}**	1.79 (1.42 - 2.25)	0.053	1.56 (0.99 - 2.45)
rs61473277	G	0.42	0.54	0.55	0.45	**1.0×10^{-8}**	1.82 (1.49 - 2.24)	**4.1×10^{-9}**	1.92 (1.55 - 2.39)	0.023	1.62 (1.07 - 2.46)
rs2073084	A	0.50	0.62	0.63	0.52	**2.7×10^{-8}**	1.79 (1.46 - 2.19)	**7.3×10^{-9}**	1.91 (1.53 - 2.37)	0.0083	1.76 (1.16 - 2.68)
rs2073085	T	0.50	0.62	0.63	0.52	**2.2×10^{-8}**	1.80 (1.46 - 2.20)	**5.9×10^{-9}**	1.91 (1.54 - 2.38)	0.0078	1.77 (1.16 - 2.69)
rs2073086	T	0.50	0.62	0.63	0.52	**2.7×10^{-8}**	1.79 (1.46 - 2.19)	**7.3×10^{-9}**	1.91 (1.53 - 2.37)	0.0083	1.76 (1.16 - 2.68)
rs14315	T	0.50	0.62	0.63	0.52	**3.1×10^{-8}**	1.78 (1.45 - 2.19)	**8.4×10^{-9}**	1.90 (1.53 - 2.37)	0.0085	1.76 (1.15 - 2.67)
rs2073088	G	0.64	0.73	0.74	0.67	**6.1×10^{-7}**	1.74 (1.40 - 2.17)	**1.1×10^{-6}**	1.77 (1.41 - 2.23)	0.057	1.55 (0.99 - 2.43)
rs2235775	A	0.50	0.62	0.63	0.52	**3.1×10^{-8}**	1.78 (1.45 - 2.19)	**8.2×10^{-9}**	1.90 (1.53 - 2.36)	0.0083	1.76 (1.16 - 2.68)
rs11090620	T	0.50	0.62	0.63	0.52	**2.3×10^{-8}**	1.80 (1.46 - 2.20)	**5.9×10^{-9}**	1.92 (1.54 - 2.39)	0.0074	1.78 (1.17 - 2.72)
rs67450864	T	0.50	0.62	0.63	0.52	**2.1×10^{-8}**	1.80 (1.46 - 2.21)	**5.4×10^{-9}**	1.92 (1.54 - 2.39)	0.0074	1.78 (1.17 - 2.72)
rs2235776	T	0.42	0.54	0.55	0.45	**8.8×10^{-9}**	1.83 (1.49 - 2.25)	**3.5×10^{-9}**	1.93 (1.55 - 2.40)	0.023	1.62 (1.07 - 2.47)

rs4823183	A	0.42	0.54	0.55	0.45	**8.7×10^{-9}**	1.83 (1.49 - 2.25)	**3.4×10^{-9}**	1.93 (1.55 - 2.40)	0.023	1.62 (1.07 - 2.47)
rs2235777	T	0.42	0.54	0.55	0.45	**9.9×10^{-9}**	1.83 (1.49 - 2.25)	**3.9×10^{-9}**	1.93 (1.55 - 2.40)	0.023	1.62 (1.07 - 2.47)
rs2294922	C	0.42	0.54	0.55	0.45	**7.5×10^{-9}**	1.84 (1.50 - 2.26)	**2.9×10^{-9}**	1.94 (1.56 - 2.41)	0.021	1.64 (1.08 - 2.49)
rs2294923	A	0.42	0.54	0.55	0.45	**8.3×10^{-9}**	1.84 (1.49 - 2.26)	**3.3×10^{-9}**	1.94 (1.56 - 2.41)	0.022	1.63 (1.07 - 2.48)
rs9626079	G	0.42	0.54	0.55	0.45	**4.6×10^{-9}**	1.85 (1.51 - 2.28)	**1.7×10^{-9}**	1.96 (1.57 - 2.44)	0.020	1.64 (1.08 - 2.50)
rs71313378	GCTTC	0.42	0.54	0.55	0.45	**8.1×10^{-9}**	1.84 (1.49 - 2.26)	**3.1×10^{-9}**	1.94 (1.56 - 2.41)	0.021	1.64 (1.08 - 2.49)
rs12167845	C	0.42	0.54	0.55	0.45	**1.7×10^{-9}**	1.90 (1.54 - 2.33)	**5.7×10^{-10}**	2.01 (1.61 - 2.51)	0.016	1.68 (1.10 - 2.56)
rs4823108	C	0.42	0.54	0.55	0.45	**5.6×10^{-9}**	1.85 (1.50 - 2.27)	**2.0×10^{-9}**	1.95 (1.57 - 2.43)	0.020	1.64 (1.08 - 2.50)
rs140963094	A	0.50	0.62	0.63	0.53	**2.2×10^{-8}**	1.80 (1.47 - 2.21)	**8.5×10^{-9}**	1.91 (1.53 - 2.37)	0.011	1.73 (1.13 - 2.64)
rs6006599	A	0.50	0.62	0.63	0.52	**3.8×10^{-8}**	1.78 (1.45 - 2.19)	**8.8×10^{-9}**	1.90 (1.53 - 2.37)	0.0066	1.79 (1.18 - 2.74)
rs2294926	T	0.50	0.62	0.64	0.51	**2.9×10^{-8}**	1.78 (1.45 - 2.19)	**3.9×10^{-9}**	1.93 (1.55 - 2.40)	0.0034	1.87 (1.23 - 2.85)
rs2294927	C	0.50	0.62	0.63	0.51	**4.8×10^{-8}**	1.77 (1.44 - 2.17)	**6.5×10^{-9}**	1.91 (1.54 - 2.38)	0.0035	1.87 (1.23 - 2.84)
rs6006602	T	0.50	0.62	0.63	0.51	**4.2×10^{-8}**	1.77 (1.44 - 2.17)	**5.8×10^{-9}**	1.91 (1.54 - 2.38)	0.0034	1.87 (1.23 - 2.85)
rs6006468	C	0.50	0.62	0.63	0.51	**4.1×10^{-8}**	1.77 (1.44 - 2.17)	**5.6×10^{-9}**	1.92 (1.54 - 2.38)	0.0034	1.87 (1.23 - 2.85)
rs6006469	G	0.50	0.62	0.63	0.51	**3.8×10^{-8}**	1.78 (1.45 - 2.18)	**5.1×10^{-9}**	1.92 (1.54 - 2.39)	0.0034	1.87 (1.23 - 2.85)
rs7587	C	0.65	0.75	0.76	0.68	**1.3×10^{-8}**	1.93 (1.54 - 2.41)	**1.0×10^{-8}**	2.01 (1.58 - 2.56)	0.014	1.77 (1.12 - 2.79)
rs1986095	G	0.50	0.62	0.64	0.51	**1.8×10^{-8}**	1.80 (1.47 - 2.21)	**2.4×10^{-9}**	1.95 (1.57 - 2.43)	0.0034	1.88 (1.23 - 2.86)
rs10656207	CTA	0.50	0.62	0.63	0.51	**5.1×10^{-8}**	1.76 (1.44 - 2.16)	**7.5×10^{-9}**	1.90 (1.53 - 2.37)	0.0036	1.86 (1.23 - 2.84)
rs5764451	G	0.65	0.75	0.76	0.68	**1.2×10^{-8}**	1.93 (1.54 - 2.42)	**9.4×10^{-9}**	2.02 (1.59 - 2.57)	0.014	1.77 (1.12 - 2.79)
rs3788604	G	0.50	0.62	0.63	0.51	**3.3×10^{-8}**	1.78 (1.45 - 2.19)	**4.5×10^{-9}**	1.93 (1.55 - 2.40)	0.0034	1.87 (1.23 - 2.85)
rs3827385	C	0.42	0.54	0.55	0.43	**3.2×10^{-8}**	1.78 (1.45 - 2.19)	**4.7×10^{-9}**	1.92 (1.54 - 2.38)	0.0077	1.77 (1.16 - 2.69)
rs2235778	C	0.50	0.62	0.63	0.51	**6.4×10^{-8}**	1.76 (1.43 - 2.15)	**9.9×10^{-9}**	1.89 (1.52 - 2.35)	0.0040	1.86 (1.22 - 2.82)
rs2281296	G	0.64	0.75	0.76	0.68	**1.4×10^{-8}**	1.92 (1.53 - 2.41)	**1.2×10^{-8}**	2.00 (1.58 - 2.55)	0.018	1.73 (1.10 - 2.73)
rs2281297	T	0.50	0.62	0.63	0.51	**1.4×10^{-7}**	1.73 (1.41 - 2.12)	**2.3×10^{-8}**	1.86 (1.5 - 2.31)	0.0051	1.82 (1.20 - 2.77)
rs2281298	A	0.42	0.54	0.55	0.44	**6.5×10^{-8}**	1.76 (1.43 - 2.16)	**1.7×10^{-8}**	1.87 (1.5 - 2.32)	0.016	1.68 (1.10 - 2.55)
rs2179642	C	0.50	0.62	0.63	0.51	**1.0×10^{-7}**	1.74 (1.42 - 2.13)	**1.6×10^{-8}**	1.87 (1.51 - 2.33)	0.0046	1.84 (1.21 - 2.80)
rs2143571	A	0.42	0.54	0.55	0.44	**9.3×10^{-8}**	1.75 (1.42 - 2.15)	**2.5×10^{-8}**	1.86 (1.49 - 2.31)	0.017	1.67 (1.10 - 2.55)
rs6006473	T	0.50	0.62	0.63	0.51	**1.0×10^{-7}**	1.74 (1.42 - 2.13)	**1.7×10^{-8}**	1.87 (1.51 - 2.33)	0.0046	1.84 (1.21 - 2.80)
rs6006474	T	0.50	0.62	0.63	0.51	**9.7×10^{-8}**	1.74 (1.42 - 2.13)	**1.6×10^{-8}**	1.87 (1.51 - 2.33)	0.0046	1.84 (1.21 - 2.80)

rs2401514	A	0.42	0.54	0.55	0.44	**6.7×10^{-8}**	1.76 (1.43 - 2.16)	**1.8×10^{-8}**	1.87 (1.5 - 2.32)	0.016	1.68 (1.10 - 2.56)
rs2073080	T	0.42	0.54	0.55	0.44	**6.7×10^{-8}**	1.76 (1.43 - 2.16)	**1.8×10^{-8}**	1.87 (1.5 - 2.32)	0.016	1.68 (1.10 - 2.56)
rs2281292	C	0.50	0.62	0.63	0.51	**5.9×10^{-8}**	1.76 (1.43 - 2.15)	**8.4×10^{-9}**	1.9 (1.53 - 2.36)	0.0036	1.86 (1.23 - 2.84)
rs1007863	C	0.51	0.62	0.63	0.51	**5.8×10^{-8}**	1.76 (1.43 - 2.15)	**8.3×10^{-9}**	1.9 (1.53 - 2.36)	0.0036	1.86 (1.23 - 2.84)
LD block 4											
rs5764455	A	0.40	0.51	0.53	0.37	**3.1×10^{-7}**	1.70 (1.39 - 2.08)	**3.7×10^{-9}**	1.92 (1.55 - 2.38)	4.4×10^{-4}	2.17 (1.41 - 3.34)
rs6006610	A	0.50	0.61	0.62	0.44	**4.5×10^{-9}**	1.85 (1.50 - 2.26)	**2.9×10^{-11}**	2.11 (1.69 - 2.63)	**6.1×10^{-5}**	2.37 (1.55 - 3.62)
rs6006611	G	0.54	0.65	0.67	0.47	**2.3×10^{-8}**	1.80 (1.47 - 2.21)	**1.2×10^{-10}**	2.09 (1.67 - 2.61)	**7.1×10^{-6}**	2.68 (1.74 - 4.12)
rs4823184	T	0.37	0.45	0.46	0.30	0.0014	1.39 (1.14 - 1.70)	**1.0×10^{-4}**	1.52 (1.23 - 1.88)	7.6×10^{-4}	2.22 (1.40 - 3.53)
rs9626087	T	0.40	0.48	0.49	0.34	**3.8×10^{-4}**	1.45 (1.18 - 1.78)	**1.4×10^{-5}**	1.62 (1.31 - 2.02)	6.7×10^{-4}	2.18 (1.39 - 3.42)
LD block 5											
rs8137707	C	0.81	0.88	0.88	0.83	**5.2×10^{-5}**	1.82 (1.36 - 2.43)	**3.4×10^{-5}**	1.92 (1.41 - 2.62)	0.039	1.83 (1.03 - 3.26)
rs8141269	A	0.82	0.84	0.84	0.84	0.24	1.17 (0.90 - 1.52)	0.26	1.17 (0.89 - 1.54)	0.75	1.10 (0.62 - 1.93)
rs76409096	TA	0.48	0.54	0.55	0.39	0.038	1.23 (1.01 - 1.50)	0.0043	1.35 (1.10 - 1.67)	0.0011	2.06 (1.34 - 3.19)
LD block 6											
rs16991328	A	0.81	0.85	0.86	0.84	0.0029	1.52 (1.15 – 2.00)	0.0039	1.53 (1.15 - 2.04)	0.41	1.26 (0.72 - 2.21)
rs9614308	G	0.82	0.85	0.85	0.83	0.11	1.24 (0.95 - 1.61)	0.10	1.26 (0.96 - 1.67)	0.40	1.27 (0.73 - 2.21)
rs4823185	C	0.72	0.74	0.74	0.72	0.71	1.04 (0.84 - 1.30)	0.58	1.07 (0.85 - 1.35)	0.63	1.12 (0.71 - 1.75)
rs34505405	G	0.72	0.74	0.74	0.72	0.67	1.05 (0.84 - 1.31)	0.54	1.08 (0.85 - 1.37)	0.65	1.11 (0.70 - 1.77)
rs16991341	A	0.43	0.50	0.51	0.36	0.0058	1.32 (1.08 - 1.61)	4.7×10^{-4}	1.45 (1.18 - 1.79)	0.0014	2.04 (1.32 - 3.16)
rs6006618	T	0.46	0.52	0.54	0.38	0.0055	1.33 (1.09 - 1.62)	3.1×10^{-4}	1.48 (1.20 - 1.83)	4.5×10^{-4}	2.26 (1.43 - 3.56)
LD block 7											
rs12484530	A	0.32	0.34	0.35	0.23	0.18	1.16 (0.93 - 1.44)	0.038	1.27 (1.01 - 1.59)	0.0042	2.07 (1.26 - 3.40)
rs9614313	T	0.72	0.74	0.74	0.75	0.60	1.06 (0.85 - 1.33)	0.66	1.06 (0.83 - 1.34)	0.93	1.02 (0.62 - 1.69)
LD block 8											
rs2401515	C	0.43	0.47	0.48	0.38	0.067	1.20 (0.99 - 1.47)	0.035	1.25 (1.02 - 1.55)	0.013	1.75 (1.13 - 2.73)
rs7289219	A	0.69	0.72	0.73	0.64	0.027	1.28 (1.03 - 1.59)	0.011	1.35 (1.07 - 1.70)	0.023	1.67 (1.07 - 2.58)

rs2401516	A	0.42	0.47	0.48	0.40	0.029	1.25 (1.02 - 1.52)	0.016	1.29 (1.05 - 1.59)	0.040	1.58 (1.02 - 2.44)
rs2401517	C	0.75	0.77	0.77	0.77	0.92	1.01 (0.80 - 1.28)	0.99	1.00 (0.78 - 1.28)	0.86	1.05 (0.64 - 1.72)
rs2401518	T	0.74	0.76	0.76	0.77	0.68	1.05 (0.83 - 1.32)	0.77	1.04 (0.81 - 1.32)	0.90	1.03 (0.63 - 1.68)
rs2401519	A	0.25	0.23	0.23	0.23	0.89	1.02 (0.81 - 1.28)	0.82	1.03 (0.80 - 1.32)	0.79	0.93 (0.57 - 1.53)
rs9626091	A	0.52	0.53	0.53	0.54	0.58	1.06 (0.87 - 1.28)	0.44	1.08 (0.88 - 1.33)	0.74	0.93 (0.62 - 1.40)
LD block 9											
rs9614315	G	0.82	0.82	0.82	0.88	0.91	1.02 (0.78 - 1.32)	0.71	0.95 (0.72 - 1.25)	0.21	0.67 (0.36 - 1.25)
rs6006477	A	0.71	0.72	0.71	0.80	0.31	1.12 (0.90 - 1.40)	0.68	1.05 (0.83 - 1.32)	0.092	0.64 (0.38 - 1.08)
rs8142117	A	0.73	0.74	0.73	0.82	0.45	1.09 (0.87 - 1.37)	0.83	1.03 (0.81 - 1.30)	0.072	0.61 (0.35 - 1.05)
LD block 10											
rs74427758	G	0.16	0.16	0.16	0.19	0.15	1.21 (0.93 - 1.58)	0.15	1.23 (0.93 - 1.63)	0.34	0.77 (0.45 - 1.31)
rs135114	C	0.85	0.86	0.86	0.92	0.14	1.24 (0.93 - 1.65)	0.39	1.14 (0.85 - 1.53)	0.089	0.52 (0.25 - 1.11)

Logistic regression analysis was performed for qualitative traits. Each phenotype was adjusted for age, gender, logarithmically transformed body mass index (BMI), and the presence of type 2 diabetes. Numbers in bold indicate a *P*-value of $< 3.0 \times 10^{-4}$. OR, (odds ratio); CI, confidence interval.

Supplementary Table 5 Associations of variations with histological phenotypes, AST, and ALT

SNP	Tested allele	Tested allele Freq	Steatosis grade		Lobular inflammation		Hepatocyte ballooning		NAS		Fibrosis stage		AST		ALT	
			β	*P*	β	*P*	β	*P*	β	*P*	β	*P*	β	*P*	β	*P*
rs5845621	C	0.39	–	0.76	+	0.39	–	0.57	–	0.75	+	0.77	–	0.43	–	0.52
rs2076212	T	0.10	–	0.67	–	0.45	+	0.32	+	0.98	–	0.14	–	0.29	–	0.64
rs139047	A	0.44	–	0.58	–	0.81	+	0.34	+	0.98	+	0.17	+	0.63	+	0.70
rs9625961	A	0.84	–	0.11	+	0.16	–	0.29	–	0.52	+	0.61	–	0.50	–	0.76
LD block 1																
rs738407	C	0.71	+	0.063	+	0.016	+	0.0094	+	0.0018	+	0.0060	+	**2.0×10^{-5}**	+	**8.9×10^{-6}**
rs734561	T	0.40	+	0.20	+	0.013	+	0.012	+	0.0047	+	**2.6×10^{-4}**	+	0.011	+	0.22
rs2006943	A	0.56	+	0.19	+	0.0039	+	0.0033	+	0.0011	+	**1.9×10^{-4}**	+	**3.4×10^{-5}**	+	**1.5×10^{-4}**
LD block 2																
rs139051	A	0.78	+	0.024	+	0.024	+	0.32	+	0.013	+	0.11	+	**8.5×10^{-5}**	+	**9.9×10^{-7}**
rs738409	G	0.60	+	0.0010	+	6.0×10^{-4}	+	0.0021	+	**7.2×10^{-6}**	+	0.0020	+	**7.6×10^{-9}**	+	**5.8×10^{-10}**
rs738408	T	0.60	+	0.0011	+	6.3×10^{-4}	+	0.0021	+	**7.6×10^{-6}**	+	0.0019	+	**5.6×10^{-9}**	+	**4.8×10^{-10}**
rs3747207	A	0.60	+	0.0011	+	6.1×10^{-4}	+	0.0020	+	**7.4×10^{-6}**	+	0.0012	+	**4.0×10^{-9}**	+	**2.2×10^{-10}**
rs12483959	A	0.60	+	4.3×10^{-4}	+	9.8×10^{-4}	+	0.0021	+	**6.0×10^{-6}**	+	0.0038	+	**7.9×10^{-9}**	+	**5.1×10^{-10}**
rs9625962	C	0.60	+	4.2×10^{-4}	+	7.9×10^{-4}	+	0.0019	+	**4.7×10^{-6}**	+	0.0035	+	**6.8×10^{-9}**	+	**4.7×10^{-10}**
rs11090617	T	0.59	+	4.8×10^{-4}	+	9.0×10^{-4}	+	0.0020	+	**5.8×10^{-6}**	+	0.0040	+	**1.1×10^{-8}**	+	**8.2×10^{-10}**
rs139052	A	0.73	+	0.0019	+	0.033	+	0.0018	+	**1.6×10^{-4}**	+	0.011	+	**2.2×10^{-6}**	+	**3.9×10^{-5}**
rs16991158	A	0.60	+	4.3×10^{-4}	+	9.8×10^{-4}	+	0.0021	+	**6.0×10^{-6}**	+	0.0038	+	**7.9×10^{-9}**	+	**5.1×10^{-10}**
rs36055245	G	0.60	+	6.6×10^{-4}	+	8.0×10^{-4}	+	0.0022	+	**7.0×10^{-6}**	+	0.0032	+	**1.5×10^{-8}**	+	**1.2×10^{-9}**
rs12484700	G	0.60	+	**2.2×10^{-4}**	+	9.1×10^{-4}	+	0.0024	+	**4.2×10^{-6}**	+	0.0046	+	**6.7×10^{-9}**	+	**1.2×10^{-9}**
rs1883350	C	0.63	+	0.0015	+	7.5×10^{-4}	+	0.0020	+	**1.3×10^{-5}**	+	0.0011	+	**3.4×10^{-8}**	+	**2.6×10^{-8}**
rs4823173	A	0.59	+	4.8×10^{-4}	+	0.0019	+	0.0025	+	**8.1×10^{-6}**	+	0.0089	+	**2.9×10^{-8}**	+	**2.5×10^{-9}**
rs2076211	T	0.59	+	7.7×10^{-4}	+	0.0033	+	0.0041	+	**2.1×10^{-5}**	+	0.015	+	**4.8×10^{-8}**	+	**3.9×10^{-9}**
rs2294433	A	0.59	+	4.8×10^{-4}	+	0.0019	+	0.0025	+	**8.1×10^{-6}**	+	0.0089	+	**2.9×10^{-8}**	+	**2.5×10^{-9}**
rs1977080	T	0.59	+	6.3×10^{-4}	+	0.0028	+	0.0032	+	**1.4×10^{-5}**	+	0.011	+	**5.2×10^{-8}**	+	**4.6×10^{-9}**

rs1977081	C	0.59	+	9.4×10^{-4}	+	0.0011	+	0.0012	+	**5.1×10^{-6}**	+	0.0048	+	**3.8×10^{-8}**	+	**3.2×10^{-9}**
rs12484466	G	0.60	+	4.0×10^{-4}	+	0.0051	+	0.0056	+	**2.3×10^{-5}**	+	0.022	+	**9.3×10^{-8}**	+	**8.6×10^{-9}**
rs2076208	C	0.77	+	0.0016	+	0.0059	+	4.3×10^{-4}	+	**1.6×10^{-5}**	+	0.0015	+	**8.5×10^{-6}**	+	**1.3×10^{-4}**
rs1997693	G	0.59	+	4.3×10^{-4}	+	0.0022	+	0.0023	+	**8.0×10^{-6}**	+	0.0083	+	**2.5×10^{-8}**	+	**1.5×10^{-9}**
rs13056638	G	0.59	+	0.0013	+	0.0034	+	0.0029	+	**2.4×10^{-5}**	+	0.0098	+	**7.4×10^{-8}**	+	**1.3×10^{-8}**
rs1883348	G	0.59	+	9.4×10^{-4}	+	0.0022	+	0.0025	+	**1.3×10^{-5}**	+	0.0076	+	**5.3×10^{-8}**	+	**5.7×10^{-9}**
rs1883349	A	0.59	+	7.3×10^{-4}	+	0.0032	+	0.0029	+	**1.6×10^{-5}**	+	0.0099	+	**4.4×10^{-8}**	+	**3.9×10^{-9}**
rs2281138	C	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2281137	C	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2281135	A	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2072907	G	0.59	+	9.2×10^{-4}	+	0.0030	+	0.0034	+	**1.9×10^{-5}**	+	0.0095	+	**5.6×10^{-8}**	+	**5.0×10^{-9}**
rs34879941	T	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs71218095	TC	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2072906	G	0.59	+	0.0013	+	0.0036	+	0.0035	+	**2.6×10^{-5}**	+	0.0087	+	**7.8×10^{-8}**	+	**9.0×10^{-9}**
rs2076207	G	0.59	+	6.9×10^{-4}	+	0.0030	+	0.0037	+	**1.7×10^{-5}**	+	0.0094	+	**6.2×10^{-8}**	+	**6.2×10^{-9}**
rs2072905	G	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2896019	G	0.60	+	4.8×10^{-4}	+	0.0014	+	0.0025	+	**8.6×10^{-6}**	+	0.0026	+	**1.5×10^{-8}**	+	**1.0×10^{-9}**
rs2401512	G	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2896020	C	0.59	+	8.5×10^{-4}	+	0.0021	+	0.0025	+	**1.2×10^{-5}**	+	0.0090	+	**6.4×10^{-8}**	+	**8.0×10^{-9}**
rs4823176	C	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2281293	C	0.59	+	0.0011	+	0.0016	+	0.0027	+	**1.3×10^{-5}**	+	0.0081	+	**3.3×10^{-8}**	+	**3.4×10^{-9}**
rs16991175	C	0.59	+	8.2×10^{-4}	+	0.0023	+	0.0033	+	**1.5×10^{-5}**	+	0.0074	+	**6.3×10^{-8}**	+	**5.8×10^{-9}**
rs35621602	A	0.59	+	0.0011	+	0.0023	+	0.0025	+	**1.5×10^{-5}**	+	0.0069	+	**5.4×10^{-8}**	+	**4.9×10^{-9}**
rs34352134	T	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs34376930	T	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs2073081	C	0.59	+	0.0012	+	0.0024	+	0.0049	+	**2.5×10^{-5}**	+	0.0075	+	**3.3×10^{-7}**	+	**2.9×10^{-8}**
rs1010023	C	0.59	+	8.7×10^{-4}	+	0.0042	+	0.0046	+	**2.8×10^{-5}**	+	0.013	+	**8.2×10^{-8}**	+	**9.2×10^{-9}**
rs1010022	G	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs8142145	C	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**

rs73176497	A	0.59	+	0.0010	+	0.0030	+	0.0033	+	**2.0×10^{-5}**	+	0.0098	+	**7.3×10^{-8}**	+	**8.1×10^{-9}**
rs5764416	T	0.69	+	0.0012	+	0.076	+	0.0041	+	**2.4×10^{-4}**	+	0.062	+	**6.8×10^{-6}**	+	**2.0×10^{-5}**
rs78023701	T	0.69	+	0.0012	+	0.068	+	0.0027	+	**1.6×10^{-4}**	+	0.054	+	**7.9×10^{-6}**	+	**2.2×10^{-5}**
rs926633	A	0.59	+	4.7×10^{-4}	+	0.0037	+	0.0032	+	**1.4×10^{-5}**	+	0.0081	+	**6.4×10^{-8}**	+	**5.6×10^{-9}**
rs3810622	T	0.70	+	7.5×10^{-4}	+	0.10	+	0.0046	+	**2.5×10^{-4}**	+	0.055	+	**9.7×10^{-6}**	+	**2.0×10^{-5}**
rs13056555	G	0.59	+	4.2×10^{-4}	+	0.0029	+	0.0036	+	**1.3×10^{-5}**	+	0.011	+	**4.8×10^{-8}**	+	**3.8×10^{-9}**
rs2294915	T	0.60	+	6.5×10^{-4}	+	0.0039	+	0.0042	+	**2.1×10^{-5}**	+	0.0087	+	**6.1×10^{-8}**	+	**5.5×10^{-9}**
rs2294916	G	0.59	+	9.2×10^{-4}	+	0.0061	+	0.0052	+	**4.0×10^{-5}**	+	0.011	+	**7.2×10^{-8}**	+	**7.6×10^{-9}**
rs4823179	C	0.60	+	7.6×10^{-4}	+	0.0057	+	0.0059	+	**3.6×10^{-5}**	+	0.012	+	**1.1×10^{-7}**	+	**1.2×10^{-8}**
rs4823180	A	0.60	+	6.5×10^{-4}	+	0.0039	+	0.0042	+	**2.1×10^{-5}**	+	0.0087	+	**6.1×10^{-8}**	+	**5.5×10^{-9}**
rs4823181	C	0.60	+	6.5×10^{-4}	+	0.0039	+	0.0042	+	**2.1×10^{-5}**	+	0.0087	+	**6.1×10^{-8}**	+	**5.5×10^{-9}**
rs13055900	G	0.60	+	6.5×10^{-4}	+	0.0039	+	0.0042	+	**2.1×10^{-5}**	+	0.0087	+	**6.1×10^{-8}**	+	**5.5×10^{-9}**
rs13055874	C	0.59	+	6.0×10^{-4}	+	0.0029	+	0.0036	+	**1.6×10^{-5}**	+	0.0066	+	**8.1×10^{-8}**	+	**6.7×10^{-9}**
rs2294917	T	0.71	+	0.0026	+	0.027	+	0.0019	+	**9.2×10^{-5}**	+	0.051	+	**7.3×10^{-5}**	+	**1.3×10^{-4}**
rs2294919	C	0.73	+	0.0024	+	0.092	+	0.0036	+	4.5×10^{-4}	+	0.026	+	**2.1×10^{-5}**	+	**3.0×10^{-4}**
rs2008451	C	0.60	+	5.3×10^{-4}	+	0.0041	+	0.0042	+	**2.0×10^{-5}**	+	0.0083	+	**5.2×10^{-8}**	+	**4.0×10^{-9}**
rs1810508	G	0.60	+	5.2×10^{-4}	+	0.0030	+	0.0042	+	**1.6×10^{-5}**	+	0.0065	+	**5.2×10^{-8}**	+	**3.9×10^{-9}**
rs12484795	C	0.59	+	5.7×10^{-4}	+	0.0014	+	0.0022	+	**6.9×10^{-6}**	+	0.0037	+	**1.4×10^{-8}**	+	**1.7×10^{-9}**
rs13054885	A	0.54	+	0.0015	+	0.0041	+	0.0045	+	**2.9×10^{-5}**	+	0.015	+	**1.2×10^{-6}**	+	**8.5×10^{-8}**
LD block 3																
rs7289329	T	0.74	+	0.032	+	0.062	+	0.014	+	0.0024	+	0.065	+	0.0018	+	0.017
rs5764043	G	0.74	+	0.027	+	0.069	+	0.013	+	0.0023	+	0.077	+	0.0018	+	0.016
rs5764044	C	0.74	+	0.029	+	0.068	+	0.013	+	0.0023	+	0.076	+	0.0024	+	0.020
rs5764045	C	0.75	+	0.018	+	0.077	+	0.016	+	0.0021	+	0.080	+	0.0018	+	0.015
rs2092501	A	0.55	+	0.0018	+	0.080	+	0.019	+	6.8×10^{-4}	+	0.11	+	**6.6×10^{-5}**	+	**1.3×10^{-5}**
rs9614293	G	0.74	+	0.024	+	0.078	+	0.014	+	0.0024	+	0.073	+	0.0019	+	0.015
rs11912828	G	0.73	+	0.0095	+	0.35	+	0.028	+	0.0080	+	0.084	+	3.8×10^{-4}	+	0.0042
rs34912062	T	0.54	+	0.0015	+	0.061	+	0.011	+	**3.7×10^{-4}**	+	0.074	+	**4.1×10^{-5}**	+	**1.1×10^{-5}**
rs1474745	C	0.54	+	0.0012	+	0.041	+	0.0088	+	**2.0×10^{-4}**	+	0.058	+	**1.9×10^{-5}**	+	**4.5×10^{-6}**

rs738491	T	0.62	+	0.0051	+	0.0091	+	0.0072	+	**1.4×10^{-4}**	+	0.020	+	**1.8×10^{-5}**	+	**2.7×10^{-5}**
rs11705218	A	0.73	+	0.014	+	0.092	+	0.015	+	0.0021	+	0.088	+	0.0017	+	0.017
rs2064361	C	0.73	+	0.014	+	0.092	+	0.015	+	0.0021	+	0.088	+	0.0017	+	0.017
rs56373884	A	0.54	+	7.1×10^{-4}	+	0.051	+	0.016	+	**2.6×10^{-4}**	+	0.096	+	**1.8×10^{-5}**	+	**6.1×10^{-6}**
rs9614294	G	0.73	+	0.014	+	0.092	+	0.015	+	0.0021	+	0.088	+	0.0017	+	0.017
rs56219234	T	0.62	+	0.0054	+	0.0055	+	0.0054	+	**8.7×10^{-5}**	+	0.013	+	**1.8×10^{-5}**	+	**1.9×10^{-5}**
rs5764047	G	0.74	+	0.017	+	0.077	+	0.012	+	0.0018	+	0.081	+	0.0019	+	0.015
rs16991236	G	0.46	+	0.058	+	0.0088	+	0.041	+	0.0018	+	0.015	+	4.1×10^{-4}	+	**2.8×10^{-4}**
rs2073082	G	0.74	+	0.017	+	0.079	+	0.012	+	0.0018	+	0.090	+	0.0015	+	0.013
rs2073083	C	0.74	+	0.017	+	0.077	+	0.012	+	0.0018	+	0.081	+	0.0019	+	0.015
rs5764430	C	0.74	+	0.012	+	0.073	+	0.018	+	0.0018	+	0.080	+	0.0025	+	0.019
rs2294921	T	0.54	+	5.3×10^{-4}	+	0.061	+	0.015	+	**2.6×10^{-4}**	+	0.080	+	**3.4×10^{-5}**	+	**7.4×10^{-6}**
rs9614300	C	0.74	+	0.017	+	0.077	+	0.012	+	0.0018	+	0.081	+	0.0019	+	0.015
rs3788603	T	0.73	+	0.012	+	0.094	+	0.016	+	0.0020	+	0.075	+	0.0019	+	0.019
rs3761472	G	0.54	+	9.7×10^{-4}	+	0.077	+	0.015	+	4.3×10^{-4}	+	0.12	+	**4.8×10^{-5}**	+	**5.7×10^{-6}**
rs932430	T	0.89	+	0.41	+	0.15	+	0.48	+	0.16	+	0.30	+	0.039	+	0.0022
rs2235772	T	0.62	+	0.0043	+	0.014	+	0.011	+	**2.1×10^{-4}**	+	0.025	+	**3.3×10^{-5}**	+	**4.1×10^{-5}**
rs2235773	C	0.74	+	0.017	+	0.077	+	0.012	+	0.0018	+	0.081	+	0.0019	+	0.015
rs61473277	G	0.54	+	7.6×10^{-4}	+	0.078	+	0.016	+	**3.8×10^{-4}**	+	0.11	+	**5.3×10^{-5}**	+	**6.7×10^{-6}**
rs2073084	A	0.62	+	0.0043	+	0.013	+	0.0076	+	**1.7×10^{-4}**	+	0.020	+	**2.5×10^{-5}**	+	**3.0×10^{-5}**
rs2073085	T	0.62	+	0.0054	+	0.014	+	0.011	+	**2.4×10^{-4}**	+	0.018	+	**3.2×10^{-5}**	+	**3.6×10^{-5}**
rs2073086	T	0.62	+	0.0043	+	0.013	+	0.0076	+	**1.7×10^{-4}**	+	0.020	+	**2.5×10^{-5}**	+	**3.0×10^{-5}**
rs14315	T	0.62	+	0.0046	+	0.013	+	0.0074	+	**1.6×10^{-4}**	+	0.019	+	**2.5×10^{-5}**	+	**2.8×10^{-5}**
rs2073088	G	0.73	+	0.015	+	0.11	+	0.015	+	0.0024	+	0.091	+	0.0016	+	0.016
rs2235775	A	0.62	+	0.0043	+	0.013	+	0.0076	+	**1.7×10^{-4}**	+	0.020	+	**2.5×10^{-5}**	+	**3.0×10^{-5}**
rs11090620	T	0.62	+	0.0053	+	0.013	+	0.0074	+	**1.8×10^{-4}**	+	0.024	+	**2.2×10^{-5}**	+	**2.5×10^{-5}**
rs67450864	T	0.62	+	0.0053	+	0.013	+	0.0074	+	**1.8×10^{-4}**	+	0.024	+	**2.2×10^{-5}**	+	**2.5×10^{-5}**
rs2235776	T	0.54	+	4.9×10^{-4}	+	0.080	+	0.020	+	**3.7×10^{-4}**	+	0.094	+	**4.3×10^{-5}**	+	**6.5×10^{-6}**
rs4823183	A	0.54	+	4.9×10^{-4}	+	0.079	+	0.020	+	**3.6×10^{-4}**	+	0.094	+	**4.3×10^{-5}**	+	**6.4×10^{-6}**

rs2235777	T	0.54	+	4.9×10^{-4}	+	0.080	+	0.020	+	**3.7×10^{-4}**	+	0.094	+	**4.3×10^{-5}**	+	**6.5×10^{-6}**
rs2294922	C	0.54	+	9.7×10^{-4}	+	0.077	+	0.015	+	4.3×10^{-4}	+	0.12	+	**4.8×10^{-5}**	+	**5.7×10^{-6}**
rs2294923	A	0.54	+	0.0010	+	0.075	+	0.015	+	4.3×10^{-4}	+	0.10	+	**5.6×10^{-5}**	+	**7.3×10^{-6}**
rs9626079	G	0.54	+	7.9×10^{-4}	+	0.067	+	0.016	+	**3.5×10^{-4}**	+	0.10	+	**4.4×10^{-5}**	+	**4.5×10^{-6}**
rs71313378	GCTTC	0.54	+	9.7×10^{-4}	+	0.077	+	0.015	+	4.3×10^{-4}	+	0.12	+	**4.8×10^{-5}**	+	**5.7×10^{-6}**
rs12167845	C	0.54	+	8.6×10^{-4}	+	0.070	+	0.016	+	**3.8×10^{-4}**	+	0.099	+	**3.9×10^{-5}**	+	**4.5×10^{-6}**
rs4823108	C	0.54	+	7.9×10^{-4}	+	0.067	+	0.016	+	**3.5×10^{-4}**	+	0.10	+	**4.4×10^{-5}**	+	**4.5×10^{-6}**
rs140963094	A	0.62	+	0.0050	+	0.015	+	0.0059	+	**1.7×10^{-4}**	+	0.028	+	**2.7×10^{-5}**	+	**2.6×10^{-5}**
rs6006599	A	0.62	+	0.0039	+	0.0089	+	0.0047	+	**9.0×10^{-5}**	+	0.016	+	**2.4×10^{-5}**	+	**1.8×10^{-5}**
rs2294926	T	0.62	+	0.0076	+	0.0080	+	0.0033	+	**1.0×10^{-4}**	+	0.012	+	**2.3×10^{-5}**	+	**1.4×10^{-5}**
rs2294927	C	0.62	+	0.0078	+	0.0078	+	0.0032	+	**1.0×10^{-4}**	+	0.011	+	**2.5×10^{-5}**	+	**1.6×10^{-5}**
rs6006602	T	0.62	+	0.0100	+	0.012	+	0.0040	+	**1.9×10^{-4}**	+	0.011	+	**2.0×10^{-5}**	+	**1.3×10^{-5}**
rs6006468	C	0.62	+	0.0097	+	0.012	+	0.0041	+	**1.8×10^{-4}**	+	0.011	+	**2.0×10^{-5}**	+	**1.2×10^{-5}**
rs6006469	G	0.62	+	0.0100	+	0.012	+	0.0040	+	**1.9×10^{-4}**	+	0.011	+	**2.0×10^{-5}**	+	**1.3×10^{-5}**
rs7587	C	0.75	+	0.013	+	0.032	+	0.0035	+	6.3×10^{-4}	+	0.018	+	4.1×10^{-4}	+	0.0032
rs1986095	G	0.62	+	0.0085	+	0.013	+	0.0043	+	**1.9×10^{-4}**	+	0.013	+	**2.6×10^{-5}**	+	**1.7×10^{-5}**
rs10656207	CTA	0.62	+	0.015	+	0.017	+	0.0045	+	**3.3×10^{-4}**	+	0.012	+	**2.1×10^{-5}**	+	**1.5×10^{-5}**
rs5764451	G	0.75	+	0.013	+	0.032	+	0.0035	+	6.3×10^{-4}	+	0.018	+	4.1×10^{-4}	+	0.0032
rs3788604	G	0.62	+	0.0100	+	0.012	+	0.0040	+	**1.9×10^{-4}**	+	0.011	+	**2.0×10^{-5}**	+	**1.3×10^{-5}**
rs3827385	C	0.54	+	0.0014	+	0.081	+	0.012	+	4.6×10^{-4}	+	0.067	+	**4.7×10^{-5}**	+	**3.3×10^{-6}**
rs2235778	C	0.62	+	0.011	+	0.014	+	0.0039	+	**2.2×10^{-4}**	+	0.018	+	**2.5×10^{-5}**	+	**1.8×10^{-5}**
rs2281296	G	0.75	+	0.012	+	0.031	+	0.0037	+	6.1×10^{-4}	+	0.016	+	**2.9×10^{-4}**	+	0.0027
rs2281297	T	0.62	+	0.011	+	0.011	+	0.0046	+	**2.0×10^{-4}**	+	0.023	+	**2.4×10^{-5}**	+	**1.8×10^{-5}**
rs2281298	A	0.54	+	0.0020	+	0.089	+	0.020	+	8.0×10^{-4}	+	0.12	+	**8.3×10^{-5}**	+	**1.0×10^{-5}**
rs2179642	C	0.62	+	0.013	+	0.013	+	0.0058	+	**2.9×10^{-4}**	+	0.019	+	**3.3×10^{-5}**	+	**2.3×10^{-5}**
rs2143571	A	0.54	+	0.0016	+	0.087	+	0.020	+	7.1×10^{-4}	+	0.11	+	**6.7×10^{-5}**	+	**8.2×10^{-6}**
rs6006473	T	0.62	+	0.010	+	0.011	+	0.0065	+	**2.4×10^{-4}**	+	0.018	+	**1.9×10^{-5}**	+	**1.2×10^{-5}**
rs6006474	T	0.62	+	0.013	+	0.013	+	0.0058	+	**2.9×10^{-4}**	+	0.019	+	**3.3×10^{-5}**	+	**2.3×10^{-5}**
rs2401514	A	0.54	+	0.0020	+	0.088	+	0.020	+	8.0×10^{-4}	+	0.12	+	**8.1×10^{-5}**	+	**1.0×10^{-5}**

rs2073080	T	0.54	+	0.0020	+	0.088	+	0.020	+	8.0×10^{-4}	+	0.12	+	**8.1×10^{-5}**	+	**1.0×10^{-5}**
rs2281292	C	0.62	+	0.011	+	0.014	+	0.0043	+	**2.2×10^{-4}**	+	0.015	+	**2.8×10^{-5}**	+	**1.9×10^{-5}**
rs1007863	C	0.62	+	0.010	+	0.012	+	0.0044	+	**2.0×10^{-4}**	+	0.015	+	**3.0×10^{-5}**	+	**2.0×10^{-5}**
LD block 4																
rs5764455	A	0.51	+	0.016	+	4.8×10^{-4}	+	0.0016	+	**2.8×10^{-5}**	+	3.2×10^{-4}	+	**5.8×10^{-5}**	+	**3.7×10^{-5}**
rs6006610	A	0.61	+	0.0064	+	0.0050	+	**1.9×10^{-4}**	+	**2.6×10^{-5}**	+	0.0028	+	**5.5×10^{-6}**	+	**7.3×10^{-6}**
rs6006611	G	0.65	+	0.0059	+	6.3×10^{-4}	+	**4.4×10^{-5}**	+	**3.4×10^{-6}**	+	6.1×10^{-4}	+	**8.9×10^{-5}**	+	**5.1×10^{-5}**
rs4823184	T	0.45	+	0.39	+	0.0054	+	0.20	+	0.018	+	0.028	+	0.040	+	0.048
rs9626087	T	0.48	+	0.034	+	0.0063	+	0.075	+	0.0020	+	0.082	+	0.053	+	0.015
LD block 5																
rs8137707	C	0.88	+	0.062	+	0.040	+	0.11	+	0.014	+	0.060	+	0.014	+	0.029
rs8141269	A	0.84	+	0.79	+	0.10	+	0.071	+	0.084	+	0.60	+	0.44	+	0.86
rs76409096	TA	0.54	+	0.36	+	0.0058	+	0.045	+	0.0075	+	0.043	+	0.36	+	0.30
LD block 6																
rs16991328	A	0.85	+	0.097	+	0.37	+	0.75	+	0.22	+	0.35	+	0.083	+	0.20
rs9614308	G	0.85	+	0.94	+	0.072	+	0.031	+	0.060	+	0.24	+	0.31	+	0.67
rs4823185	C	0.74	+	0.98	+	0.27	+	0.26	+	0.25	+	0.61	–	0.97	–	0.66
rs34505405	G	0.74	–	0.78	+	0.41	+	0.45	+	0.47	+	0.66	–	0.87	–	0.62
rs16991341	A	0.50	+	0.27	+	0.033	+	0.053	+	0.017	+	0.042	+	0.13	+	0.11
rs6006618	T	0.52	+	0.21	+	0.028	+	0.024	+	0.010	+	0.062	+	0.049	+	0.048
LD block 7																
rs12484530	A	0.34	+	0.15	+	0.17	+	0.097	+	0.052	+	0.063	+	0.49	+	0.35
rs9614313	T	0.74	+	0.95	+	0.95	+	0.29	+	0.52	+	0.67	–	0.81	–	0.42
LD block 8																
rs2401515	C	0.47	+	0.25	+	0.078	+	0.12	+	0.044	+	0.15	+	0.026	+	0.017
rs7289219	A	0.72	+	0.092	+	0.97	+	0.41	+	0.28	+	0.95	+	0.070	+	0.0058
rs2401516	A	0.47	+	0.47	+	0.17	+	0.11	+	0.089	+	0.39	+	0.050	+	0.034

rs2401517	C	0.77	–	0.51	+	0.16	+	0.38	+	0.39	+	0.34	–	0.77	–	0.31
rs2401518	T	0.76	–	0.42	+	0.096	+	0.40	+	0.36	+	0.35	+	0.76	–	0.59
rs2401519	A	0.23	+	0.63	–	0.095	–	0.42	–	0.30	–	0.24	–	0.94	+	0.56
rs9626091	A	0.53	–	0.15	+	0.44	+	0.74	–	0.94	+	0.19	–	0.34	–	0.57
LD block 9																
rs9614315	G	0.82	–	0.50	–	0.41	–	0.82	–	0.57	+	0.50	+	0.78	+	0.78
rs6006477	A	0.72	–	0.80	+	0.88	+	0.82	+	0.85	+	0.54	–	0.37	–	0.33
rs8142117	A	0.74	–	0.59	–	0.88	+	0.85	–	0.94	+	0.40	–	0.42	–	0.27
LD block 10																
rs74427758	G	0.16	–	0.19	+	0.82	+	0.24	+	0.84	+	0.85	–	0.26	–	0.33
rs135114	C	0.86	–	0.33	–	0.10	–	0.15	–	0.079	–	0.31	+	0.33	+	0.43

Linear regression analysis was applied for quantitative traits (individual histological scores for steatosis grade, lobular inflammation, hepatocyte ballooning, NAS, and fibrosis stage; AST and ALT levels). Values of AST and ALT were logarithmically transformed. Each phenotype was adjusted for age, gender, logarithmically transformed body mass index (BMI), and the presence of type 2 diabetes. Numbers in bold indicate a *P*-value of $< 3.0 \times 10^{-4}$. NAS, NAFLD activity score; AST, aspartate aminotransferase; ALT, alanine aminotransferase.